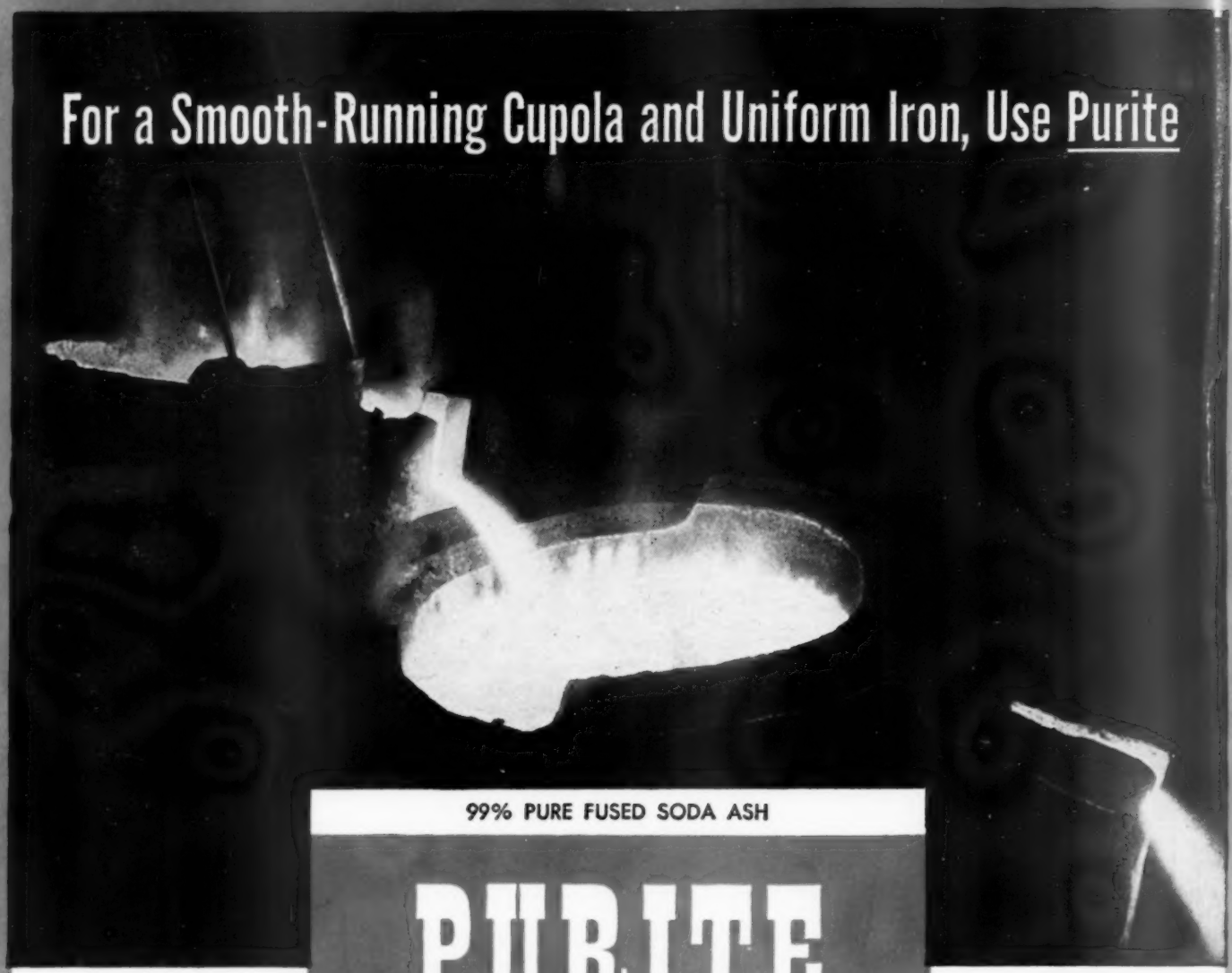
September, 1949

THE FOUNDRY

wherever metals are cast...

STILL THE BEST OF THE BENTONITES

For a Smooth-Running Cupola and Uniform Iron, Use Purite



99% PURE FUSED SODA ASH

PURITE

The Scientific Flux for Better Melting and Cleaner Iron

A smooth-operating cupola, from the start to the finish of the heat, is the first essential in maintaining uniform iron in the mass production of specification castings.

Purite—in the cupola hearth or in the ladle—helps smooth out variations in the molten metal. By accelerating combustion reactions, Purite restricts the combustion zone to a smaller, hotter area over the tuyeres; it prevents bridging and reduces oxidation of the metal charge. Purite makes a refining slag which purges the molten iron of sulfur, oxides and silicates and thus helps to improve machinability and to reduce shrinkage and segregation defects.

Purite has been used for over 25 years in helping to make sounder and better castings. Can you afford to overlook this inexpensive means of improving your castings?

Our advice is always available—to help you improve your cupola practice and make better castings with Purite.

MATHIESON CHEMICAL CORPORATION
Mathieson Building, Baltimore 3, Maryland
In Canada: Railway & Power Engineering Corporation, Limited

Mathieson
CHEMICALS

Purite (Fused Soda Ash) . . . Chlorine Dioxide . . . Caustic Soda . . . Soda Ash . . . Bicarbonate of Soda . . . Ammonia, Anhydrous & Aqua . . . Sodium Chlorite Products . . . Liquid Chlorine . . . HTH Products . . . Dry Ice . . . Carbonic Gas . . . Sodium Methylate . . . Sulphuric Acid . . .

TECHNOLOGY DEPARTMENT

Chapman Valves meet ASTM "Class 50" specifications *with Nickel Alloy Cast Iron*

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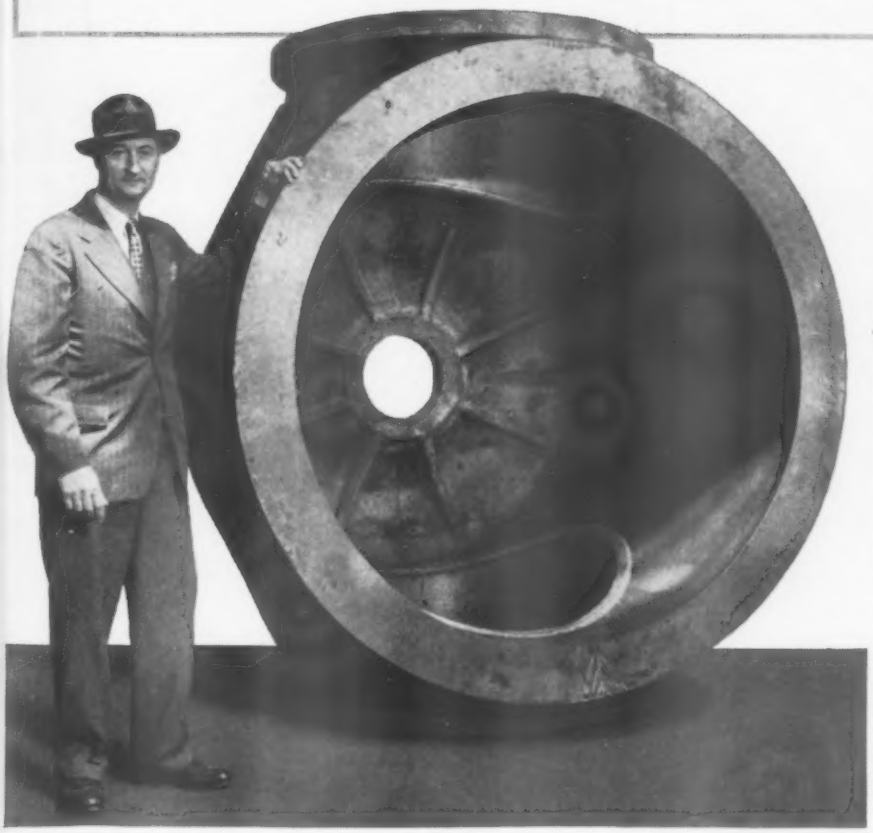
DETROIT



50,000 PSI MINIMUM TENSILE STRENGTH DEVELOPED IN VALVE CASTINGS WEIGHING UP TO FIFTEEN TONS EACH

Containing 2.00 per cent nickel, 0.25 per cent molybdenum and 0.75 per cent chromium . . . these vital units cast by The Chapman Valve Manufacturing Company of Indian Orchard, Mass., comprise key parts of the equipment being supplied for the Delaware Aqueduct by S. Morgan Smith Company, York, Pa.

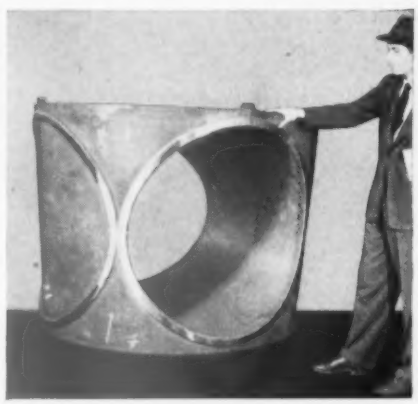
THE flow of a great underground river of Catskill mountain water for New York City will be controlled in subsurface valve chambers by these Chapman cone valves made of nickel alloy cast iron.

The nickel alloy iron adopted for these castings meets A.S.T.M. "Class 50" specifications, and provides sound, dense, high-strength units. Aqueduct valves, however, operate partially closed for long periods, and the resultant turbulence attacks surface metal of both seats and rings. To defeat this corrosive and erosive action, the Board of Water Supply specifies that these parts be faced with Monel*. The valve manufacturer applies Monel over a base layer of Ni-Rod*, the nickel electrode specially developed for cast iron welding.

Readily developing 50,000 p.s.i. tensile strength minimum, these valves exemplify how the right nickel cast iron not only helps foundrymen meet high mechanical property specifications, but the metal also assures trouble-free performance for the ultimate user.

Write for our recommendations regarding the best nickel alloyed iron for your applications.

*Reg. U. S. Pat. Off.



This cone for the 42" Chapman nickel iron valve body, pictured above, shows the Monel facing applied over a Ni-Rod base to provide maximum resistance to erosion and corrosion.

EMBLEM OF INCO SERVICE

Over the years, International Nickel has accumulated a fund of useful information on the properties, treatment, fabrication and performance of engineering alloy steels, stainless steels, cast irons, brasses, bronzes, nickel silver, cupro-nickel and other alloys containing nickel. This information is yours for the asking. Write for "List A" of available publications.

THE INTERNATIONAL NICKEL COMPANY, INC.

67 WALL STREET
NEW YORK 5, N. Y.

A *Helping Hand*

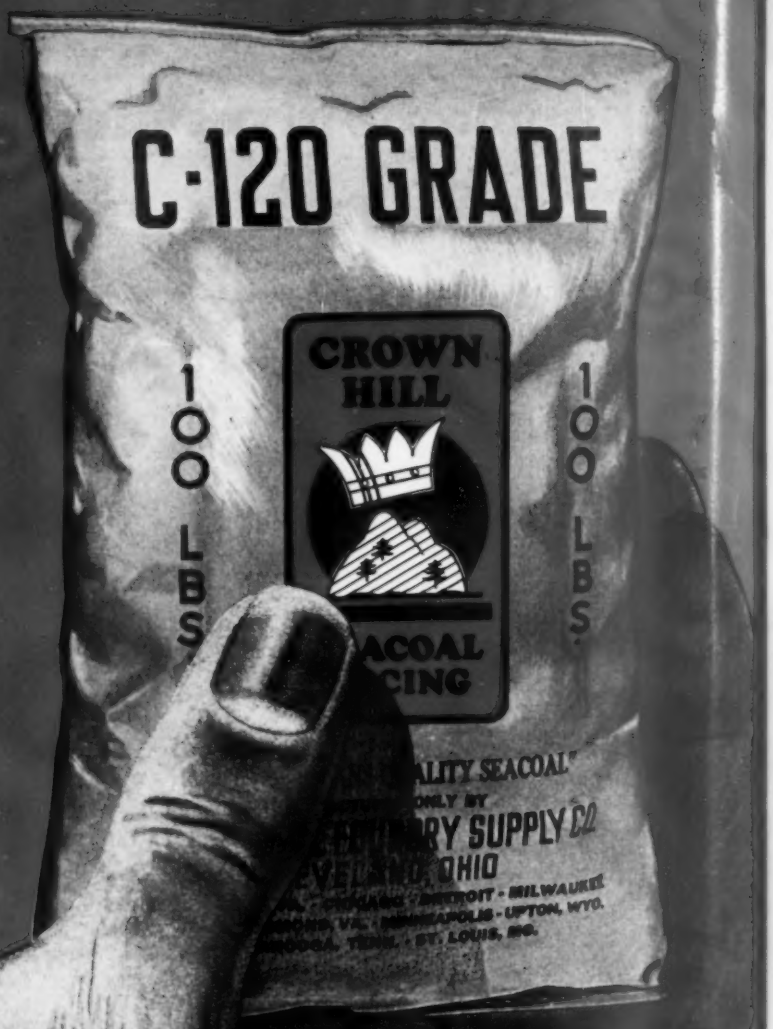
for Foundrymen Everywhere

● Foundrymen everywhere choose Crown Hill Seacoal Facing. Here's why: Crown Hill cuts cleaning costs, produces a smoother finish and eliminates hard spots.

Made from high volatile, quick-flash coal, Crown Hill vents rapidly. Low sulphur content eliminates hard spots. Because of the high fusion point of its small ash content, molten iron cannot fuse to it.

Put Crown Hill Seacoal Facing to the test in your own foundry (like so many others have) and see the difference.

Made by the Long-Time Friend of the Foundries



GURES FROM BUREAU OF MINES
EPT. OF INTERIOR OF THE U. S.
(Moisture Free)

PROXIMATE ANALYSIS	
Volatile Matter (V.C.M.)	38.9%
Fixed Carbon	57.4%
Ash	3.7%
	100.0%

ULTIMATE ANALYSIS	
Hydrogen	5.4%
Carbon	82.0%
Nitrogen	1.8%
Oxygen	6.8%
Sulphur	.7%
Ash	3.7%
	100.0%
Fusion Point of Ash	2,980° F.

- *It vents the mold quickly*
- *Eliminates hard spots*
- *Cuts cleaning costs*

THE FEDERAL FOUNDRY SUPPLY COMPANY

Seacoal Plant
CROWN HILL, W. VA. • CHICAGO • DETROIT • MILWAUKEE • RICHMOND, VA.
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SEPTEMBER, 1949

THE FOUNDRY

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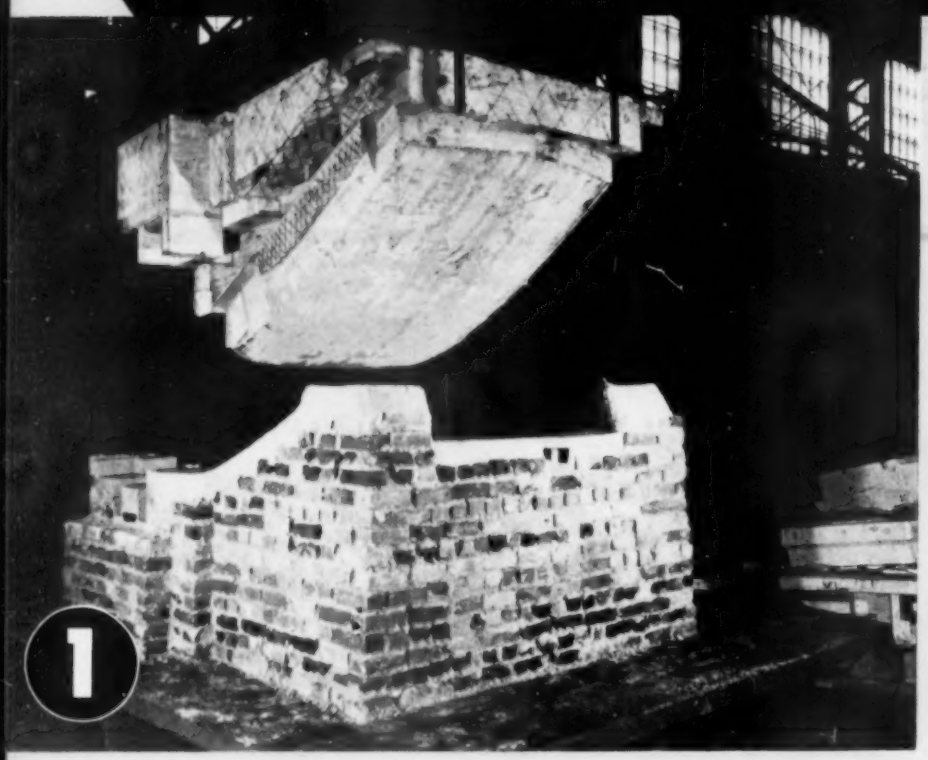
LINOIL SAFEGUARDS B



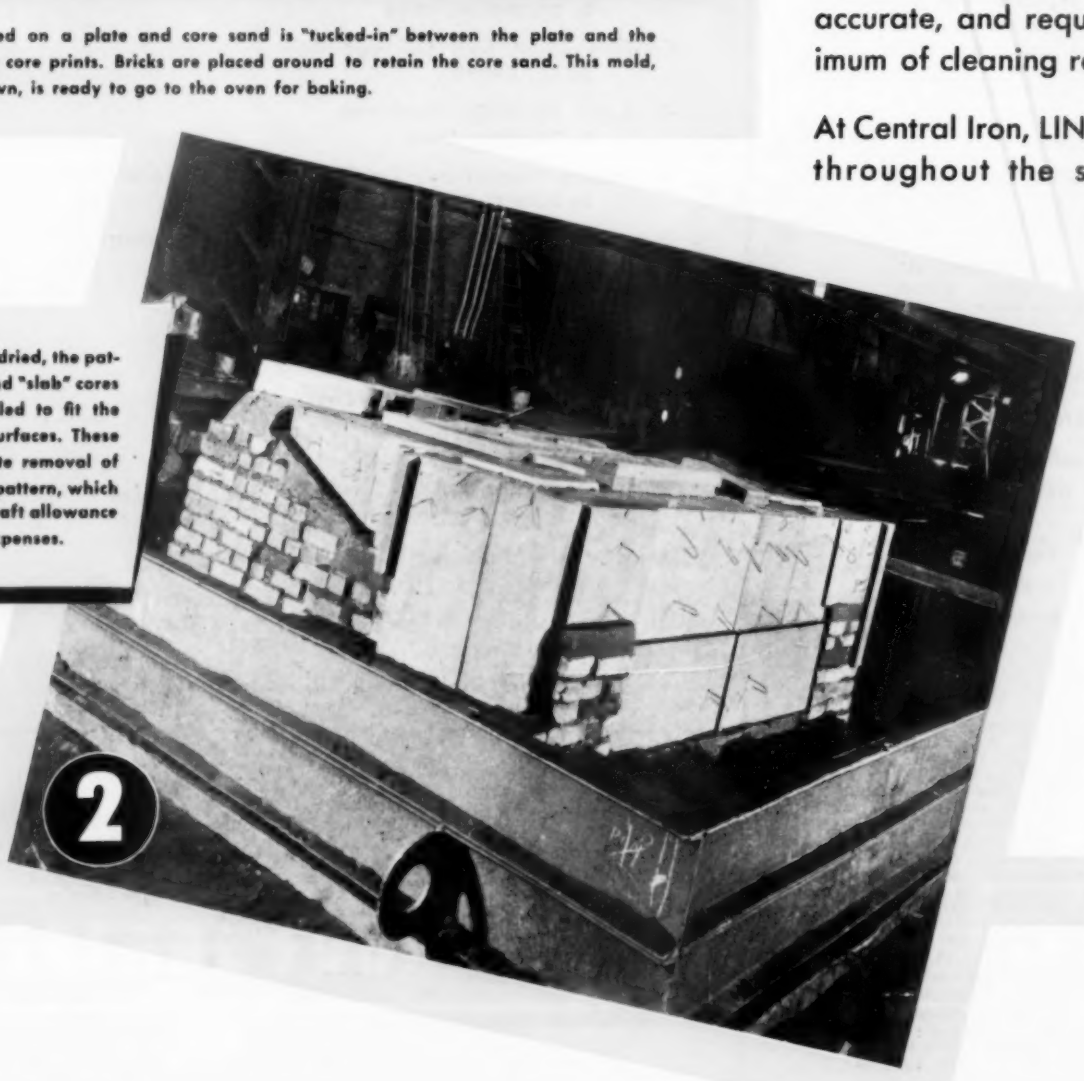
Pattern is inverted on a plate and core sand is "tucked-in" between the plate and the pattern up to the core prints. Bricks are placed around to retain the core sand. This mold, with pattern drawn, is ready to go to the oven for baking.

Automobile body dies—such as this 9-ton roof panel punch—are "one-shot" castings...the pattern is scrapped after pouring one casting.

So, with no production runs... with all operating expenses tied up in one casting per pattern, Central Iron Foundry does everything possible to make certain that the first casting produced is sound, accurate, and requires a minimum of cleaning room labor.

At Central Iron, LINOIL is used throughout the shop. The

After the mold is dried, the pattern is replaced and "slab" cores are sawed and filed to fit the exposed pattern surfaces. These slab cores facilitate removal of the straight sided pattern, which is made without draft allowance so as to reduce expenses.



S BODY DIE PRODUCTION

FOUNDRY
MICHIGAN

LINOIL-bonded core sand used to form mold surfaces must work freely... bake thoroughly... hold accurate dimensions.

LINOIL slab cores have an even, all-the-way through bake... after being sawed into sections or filed down to fit patterns, the sized slab is just as strong and sharp-edged as the original stock slab.

For lower cleaning room costs ... for more sound, accurate castings... use LINOIL, the core-oil of foundrymen everywhere.

The completed drag. A flask has been placed around the mold and molding sand is used to fill the space and provide a backing for the slab cores. Interior cores (used only to lighten the casting weight) are wired to core seats in the cope and will hang down inside the mold.

• • •

A completed roof panel trim die adapter... weighs 18,005 pounds. Castings up to 60,000 pounds are made by this method.

• •

THE LINOIL THE LOGICAL OIL

WERNER G. SMITH COMPANY

(DIVISION OF ARCHER-DANIELS-MIDLAND COMPANY)

2191 WEST 110th STREET • CLEVELAND 2, OHIO

This New PANGBORN Rotoblast* Room

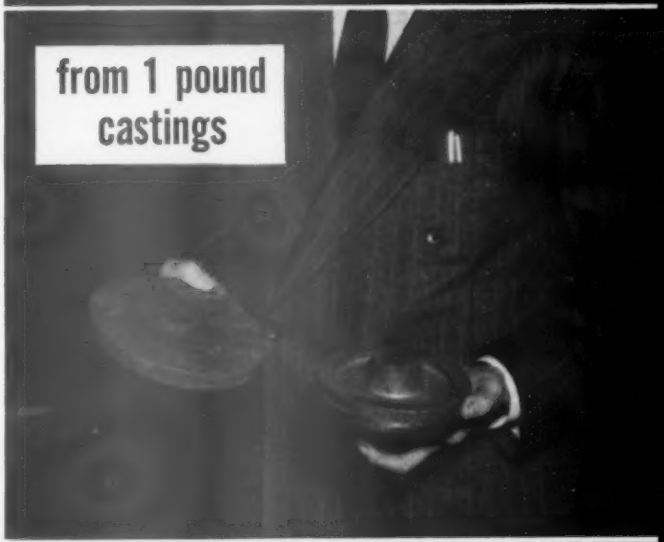
ONE WORKER *can run this special* ROTOBLAST *Room easily (Harris-Seybold use two to speed up handling outside of Room). Before* ROTOBLAST, *six men working three shifts were required to keep up with the work!*

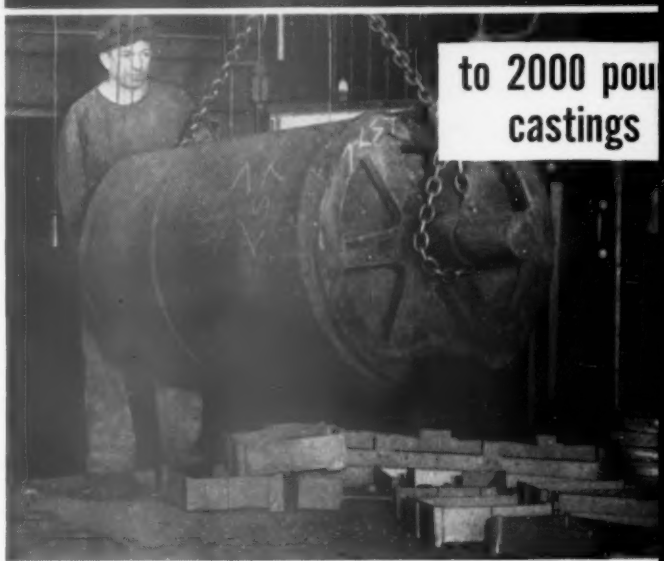
Pangborn

* Trademark of Pangborn Corporation

Saves $10,160 Yearly on Labor Costs . . . . Cuts Cleaning Time 66⅔% for Harris-Seybold

NEW ROTOBLAST ROOM CLEANS ENTIRE FOUNDRY OUTPUT . . .





Cleveland Plant saves $40 daily on labor costs while cutting cleaning time on castings from 48 to 16 man-hours

Yes—this **new** Pangborn ROTOBLAST Room completely cleans **every single casting** Harris-Seybold make for their famous offset printing presses. That means old-fashioned sand-blasting bottlenecks are now eliminated . . . adding up to a **saving of 32 man-hours a day** . . . a better cleaning job in **⅓ the time! Actually $10,160 a year** are saved on labor costs alone!

Here are more savings: castings are **cleaner** than ever before, even though the intricate work ranges from one pound to one ton! That means **faster machining . . . less wear** on machine tools. Abrasive costs are lower with Pangborn ROTOBLAST, adding more savings to the record!

Pangborn ROTOBLAST: **Cleans faster** because it throws more abrasive over a larger area with greater density. **Cleans better** because it produces a finer surface than old-fashioned methods. **Cleans cheaper** because it requires less horsepower . . . uses less man power . . . needs less maintenance . . . eliminates need for air compressor!

FIND OUT HOW MUCH YOU CAN SAVE!

No matter what you clean . . . what you cast . . . Pangborn ROTOBLAST equipment saves you money on your cleaning operation. For complete details of how Pangborn ROTOBLAST can help you, write today for Bulletin 211A. Address: PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Maryland.

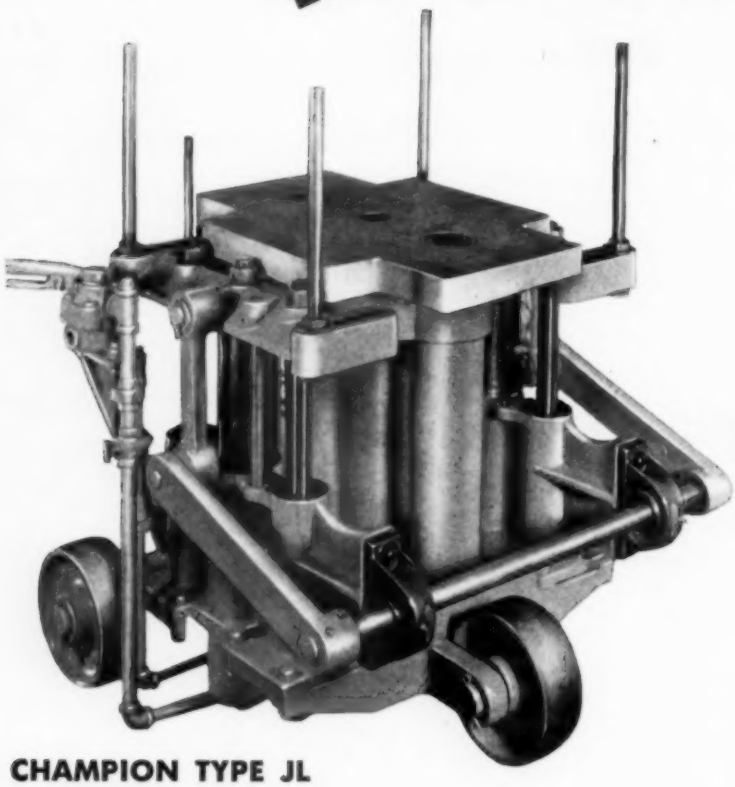
MORE THAN 25,000 PANGBORN MACHINES SERVING INDUSTRY

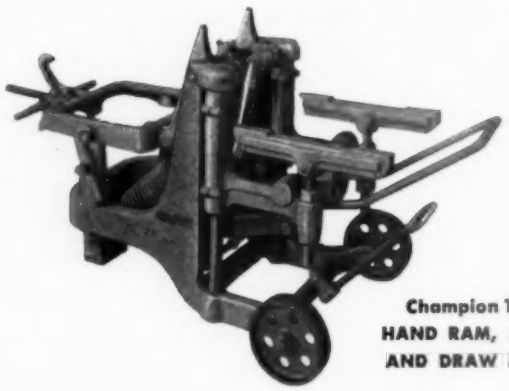
BLAST CLEANS CHEAPER

with the right equipment for every job

SPEED ACCURACY EASY OPERATION

The





Champion Type W.
HAND RAM, ROLLOVER
AND DRAW MACHINE

CHAMPION TYPE JL JOLT PIN LIFT

Accommodates flasks up to 30″ x 8″ draw.

Designed for perfect ramming, accurate draw, low maintenance, long life.

All guides and bushings in jolt and pin lift are hardened and ground steel.

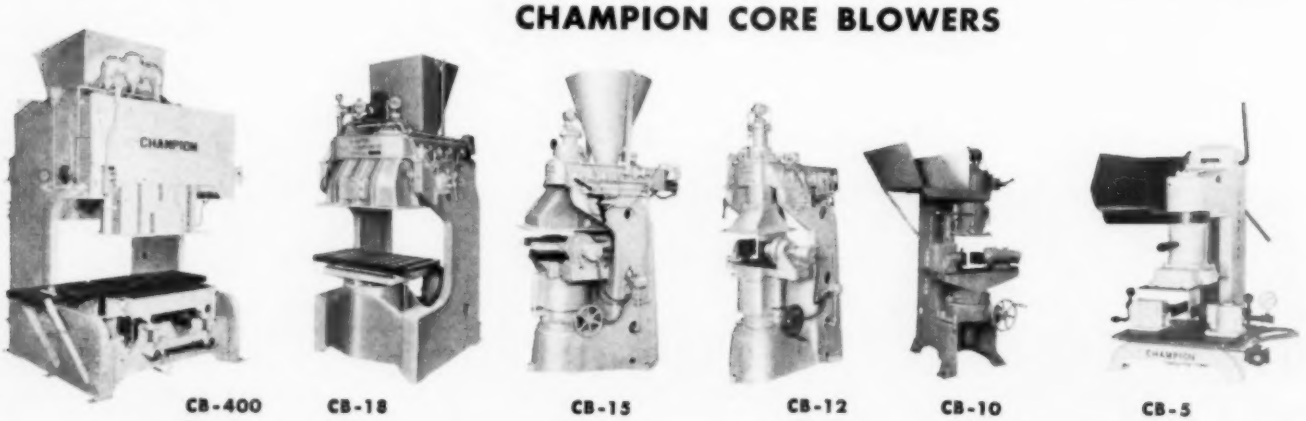
Equalizing mechanism is also fitted with hardened and ground pins and bushings.

Crank shaft operates in sealed dust proof ball bearings.

Champion Type JM
POWER JOLT, HAND
ROLLOVER AND
DRAW MACHINE

• • • •

CHAMPION CORE BLOWERS

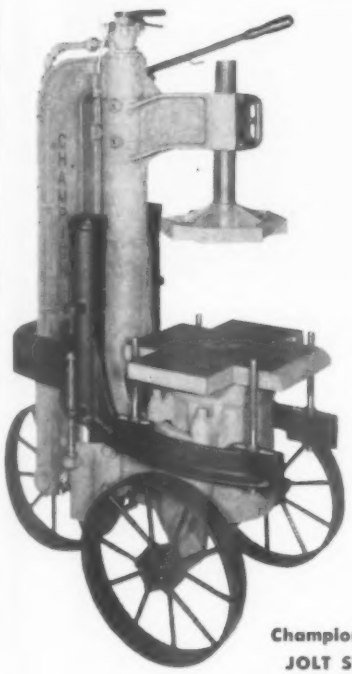


CB-400 CB-18 CB-15 CB-12 CB-10 CB-5

"Ear-marks" of a Champion!

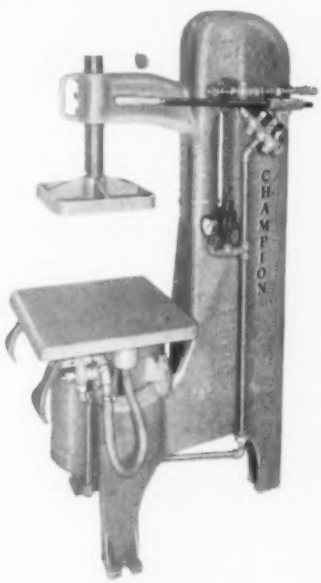
Takes more than one good trait to win the blue ribbon —and Champion molding machines and core blowers have earned high favor through their balance of speed, consistent accuracy and easy operation.

High quality castings that require minimum machining and produce less scrap are least costly in the long run. Champion molding machines and core blowers give you a long lead toward this goal.



Champion Type JSL
JOLT SQUEEZE
PIN LIFT

Champion Type JS
PORTABLE
JOLT SQUEEZER



Champion Type JS
STATIONARY
JOLT SQUEEZER

Champion engineers and production specialists are glad at all times to give you the benefit of their long experience in helping you solve any mold or core making problems. Champion molding machines, jolt squeezers, rollover and draw machines have the high productive capacity, the precision and ease of operation that make the big difference in profitable production. There's a place in any up-to-date foundry for Champion equipment. Let us show you what these efficient machines can do for you.

CHAMPION FOUNDRY AND MACHINE COMPANY

SALES OFFICE: 1314 W. 21st STREET
CHICAGO 8, ILLINOIS

GENERAL OFFICE AND PLANT:
ROCKFORD, ILLINOIS

MOLDING MACHINES **CORE BLOWERS** **THE ELECTRIC RIDDLE**

A/B Westin & Backlund
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Societa Torinese Adesivi Resine
Corso Moncalieri 414, Torina, Italy

• *HEAVY DUTY* MOLDING MACHINES •

11-32 Type "D"
Jolt Squeezer with
Pneumatic Pattern Draw

ECONOMY in molding machines is measured by the amount of good molds produced under the pressure of continuous operation, without loss or failure. In industry ECONOMY is a part of production —the bigger the output, the lower the cost. Nicholls Molding Machines have *that* ability, giving you the best possible results at the lowest possible costs. Nicholls has a complete line of stationary and portable types for the production of light, medium and heavy castings. Can be furnished with electric controls for push button operation.

Wm. H. NICHOLLS Co., Inc.
RICHMOND HILL 18, LONG ISLAND, NEW YORK

ESTABLISHED 1910

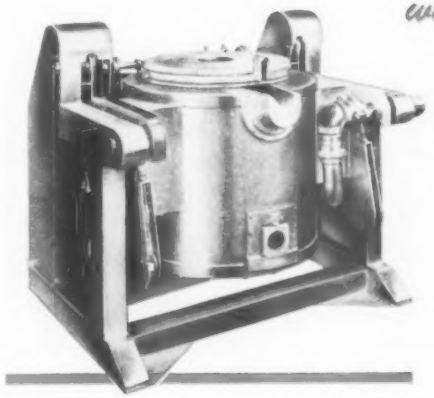
Foreign Manufacturers and Selling Agents—For Continental Europe and Great Britain—George Fischer, Limited, Schaffhausen, Switzerland

NICHOLLS

HERE'S HOW...

LINDBERG-FISHER TILTING FURNACES DOUBLE PRODUCTION....

with half as many furnaces - at 39% lower fuel cost!



See your Lindberg-Fisher man for full details, or write for Bulletin No. 57-A.

Hammond Brass Works, Hammond, Indiana, manufacturers of fine bronze, valves and fittings, recently installed 6 Lindberg-Fisher constant-arc nose pouring, gas fired, tilting furnaces for their melting and pouring operations. They have operated these furnaces for more than 6 months, 8 hours a day, 5 days a week. Their experiences show greatly increased production, reduced production costs, with safer and cleaner operating conditions.

Hammond Brass Works reports that small, obsolete furnaces were replaced with half as many large, modern Lindberg-Fisher mechanized tilting furnaces. The number of necessary heats per day was reduced one-third while double the quantity of molten metal was handled. Fuel consumption per lb. of metal was reduced 39%, labor cost per operation was lowered and crucible life increased from 65-70 heats to an average of 95-100 and up to 200 heats per crucible. Clean-up time has been reduced and maintenance problems simplified—resulting in a safer, cleaner operation, and raised employee morale.

Fisher Furnaces

A DIVISION OF LINDBERG ENGINEERING CO.

2453 West Hubbard Street, Chicago 12, Illinois

FOR FASTER PRODUCTION OF...

Better, Cleaner Castings

STEEL, MALLEABLE, GREY IRON, NON-FERROUS USE...

DELTA CORE & MOLD WASHES

Three easy-to-understand reasons why more foundries use DELTA Core and Mold Washes . . .

1. MORE PERFECT CASTINGS . . . 2. LOWER CLEANING ROOM COSTS . . . 3. LESS SCRAP IN MACHINING.

HERE'S WHY...

a. Delta Core and Mold Washes "Anchor" themselves by penetrating from 3 to 5 grains deep into the sand. This bond between the wash and the sand . . . a distinctive DELTA characteristic . . . produces an expansion-resisting coating essential to the production of finer finished castings.

b. The hot strength of Delta Core and Mold Washes increases with each degree of temperature rise from 1800°F to 3000°F providing maximum critical hot strength for all foundry applications.
The higher hot strength of DELTA Core and Mold Washes eliminates surface sand fissuring, excessive sand expansion and distortion.

c. No gas leakage through Delta Core and Mold washed surfaces. Gases produced by decomposition of organic binders in the core sand cannot leak through Delta Core and Mold washed surfaces to contact the molten metal. Only Delta Core and Mold Washes provide this unique and all-important insurance against defective castings resulting from core gas leakage. DELTA Core and Mold Washes insure more perfect castings with finer finished surfaces.

DELTA CORE & MOLD WASH-BASE
Mix with silica flour and water to produce finished wash.

•

FOR STEEL
STEELKOAT — Special Core and Mold Wash.

•

FOR GREY IRON & MALLEABLE
Grakoat — Blackoat — Hi-temp.

•

FOR NON-FERROUS METALS
Non-FerrusKoat.

•

FOR ALL SAND CAST METALS
THERMOKOAT — It's Plasti-Lastic.
PYROKOAT-Hi-Speed.

•

FOR UNUSUALLY HIGH TEMPERATURE CONDITIONS
Z-KOAT-High-fusion-temp wash.

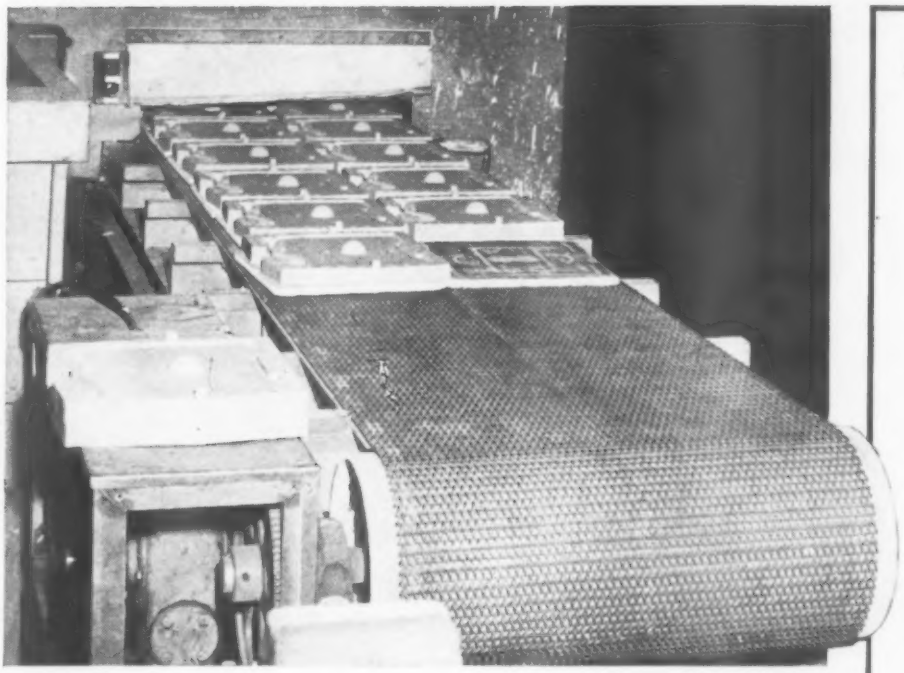
•

• *Ask for a liberal working sample.*

There is no "just as good" substitute for any DELTA Core and Mold Wash just as there is no substitute for DELTA'S scientific laboratory control of production which safeguards the quality and uniformity of all DELTA Foundry Products. DELTA Research laboratories developed, and pioneered the use of, Plastic-type Core and Mold Washes . . . and still leads the field in the development of new products for improved foundry practices.

DELTA OIL PRODUCTS CO.

MILWAUKEE 9, WISCONSIN



Another Bakelite Service to Cut Foundry Costs

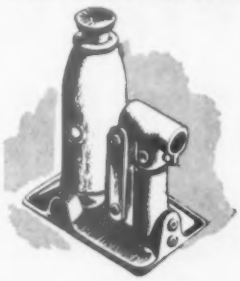
BAKELITE Bonding Resins for sand cores are the outgrowth of more than 35 years' experience in developing resins for such foundry products as snagging wheels, sealing solutions for the reclamation of porous castings, varnishes for spraying on gates to retard the formation of burnt-on sand, and densified wood for long-lasting parting boards and patterns.

BAKELITE Phenolic and Urea core bonding resins are available in liquid and powder forms, suitable for both ferrous and nonferrous castings. These resins offer many efficiency-promoting advantages, such as the following:

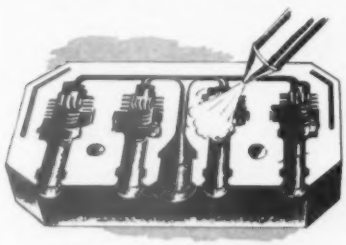
- **Less binder required for given tensile strength of baked cores.**
- **Finer sands permitted, without greatly extending baking time.**
- **Can be baked in one half, or less, the time usually required for heat-reactive non-resin binders.**
- **Cores can be baked by high-frequency heating in minutes, rather than hours.**
- **Improved collapsibility of cores.**
- **Better surface finish on castings.**
- **Longer core storage life because of improved moisture resistance.**

For the full story on BAKELITE core bonding resins get your copy of the Technical Data File by filling out the coupon below. It contains a great deal of valuable information that will enable you to apply these products profitably to your own operations.

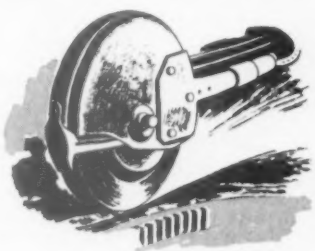
A many-sided service for foundries



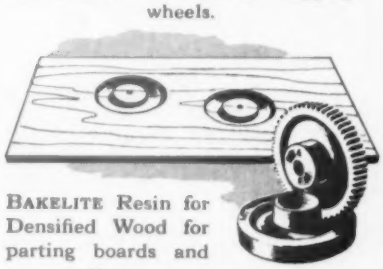
BAKELITE Sealing Solutions for reclaiming porous castings.



BAKELITE Varnishes for spraying on gates to retard burnt-on sand.



BAKELITE Resins for bonding abrasive grains in heavy-duty snagging wheels.



BAKELITE Resin for Densified Wood for parting boards and patterns.

Bakelite
TRADE-MARK
Phenolic and Urea
CORE BONDING RESINS

BAKELITE CORPORATION

BAKELITE CORPORATION
Unit of Union Carbide and Carbon Corporation UCC
30 East 42nd Street, New York 17, N. Y.

GET YOUR FREE COPY OF DATA FILE

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30 East 42nd Street, New York 17, N. Y.

- ☐ We would like to talk to your representative.
- ☐ We would like to obtain samples.
- ☐ We are primarily interested in casting ☐ iron ☐ steel ☐ brass ☐ bronze ☐ aluminum ☐ magnesium ☐ other.
- ☐ We wish the Technical Data File giving economic advantages and formulation suggestions.

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I COULDN'T BELIEVE MY EYES WHEN TEST* SHOWED

Malleabrasive CUT BLAST CLEANING COSTS 58.9%

*. . . made at Ohio Forge & Machine Corporation.

The results of Ohio Forge & Machine Corporation's seven week Malleabrasive test were terrific . . . *43.5%* saved on cost of abrasive alone!

The test was run on forgings, and the next big saving to show up was *81.3%* less cost for replacement parts!

Less down time, less labor handling abrasive and replacement parts increased production 12.8% . . . *total savings*† add up to *58.9%* . . . big money no matter how you look at it!

Send for this Positive Proof!

Malleabrasive differs from every other shot and grit on the market today. It's more than "heat treated" or "annealed" . . . *Malleabrasive is guaranteed* to out-perform ordinary shot and grit when comparative tests are properly run!

See for yourself how Malleabrasive has cut cleaning costs up to 50% and more for other foundries! Recent tests of Malleabrasive give complete savings. Write for your copy today to: THE GLOBE STEEL ABRASIVE CO., Mansfield, Ohio.

Packed in new black and orange striped 100-pound bags.

† *Send for test results which show total savings*

PATENTED‡

Malleabrasive®

‡ U.S. Patent #2184926 (other patents pending.)

THE GLOBE STEEL ABRASIVE CO., MANSFIELD, OHIO

. MANUFACTURERS OF METAL ABRASIVES SINCE 1907 .

Entire weight of *Foundromatic* shakeout plus casting and sand load is carried on springs which absorb 90% of operating vibration. Centrifugal force is only load on shaft and bearings. Long spring life assured by spring bumper guide design. Body is one piece welded, stress-relieved structure.

Shakes Out 1420 Tons in Nine Hour Shift!

FLOOR CAPACITY was increased in this Cincinnati, Ohio, foundry when two 8 x 10 ft *Foundromatic* shakeouts were installed in parallel. Foundry superintendent reports this multiple unit handles flask loads up to 71,000 lbs. In one nine hour shift they average as high as 40 complete molds!

You can get similar efficiency with *Foundromatic* shakeouts. Available in eight sizes ranging from 4 x 6 ft with capacity of four tons, to 8 x 10 ft with capacity of 25 tons. Multiple shakeouts are installed with capacities of 100 tons or larger.

Flask breakage is cut to a minimum with *Foundromatic* shakeouts because load is evenly distributed over the deck during operation.

For additional information, call your nearby Allis-Chalmers Sales Office or WRITE FOR NEW BULLETIN 07B6365A.

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A note on Abrasives

How Quality Control serves you every production hour

You can use and replace grinding wheel after grinding wheel... belt after belt... or disc after disc—depending upon the requirements of your work—and be sure that each replacement will continue to provide the same standards of abrasive performance. Your production continues on schedule.

These are the direct results of Quality Control in the production of abrasives by CARBORUNDUM. This control covers every step in the production of grain and the processing of belts, wheels, discs, and other abrasive products.

It assures abrasive particles of uniform grain size and classification. It guarantees that backings and bonds will perform as expected. Of primary importance, it assures consistent high quality and productive service in each abrasive tool. Because of our quality control, bonded or coated abrasives can be specified more exactly... and reordered, with confidence of dependable performance.

The continuation of efficient, high quality production is assured when you are using abrasives by CARBORUNDUM.

The Carborundum Company, Niagara Falls, New York.

The only complete line of Abrasive Tools is

CARBORUNDUM

TRADE MARK

"Carborundum" is a registered trademark which indicates manufacture by The Carborundum Company

Engineering News
ON ABRASIVE PRODUCTS

EFFECTIVENESS OF BACKSTAND BELT GRINDING

Used by a steadily increasing number of industrial plants and buffing and plating shops, the backstand belt grinding method offers practical production advantages and economies. It is particularly effective on operations ranging from rather heavy stock removal to the final polishing of surfaces preparatory to buffing. Consistently better finishes are obtained through the use of factory-coated abrasive belts. Units of work are completed in less time. The percentage of machine down-time is extremely low.

This increased efficiency has led to a 25% to 100% conversion to the belt backstand technique in plants which formerly used set-up wheels headed with abrasive grain.

V20 BOND SEGMENTS

New V20 segments now make available a fast, cool, free-cutting abrasive for efficient, economical surface grinding applications. V20 segments are structurally uniform throughout; they perform with the same effectiveness during their entire life.

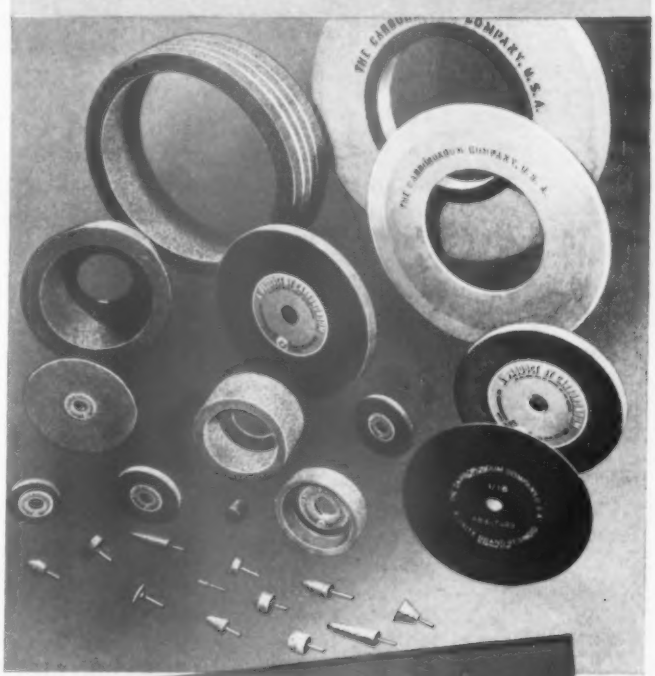
Because of their high degree of uniformity of structure, V20 segments incorporate greatly improved size holding characteristics and make possible the production of closely controlled surface finishes.

V20 segments offer the following advantages not found in competitive types of segments.

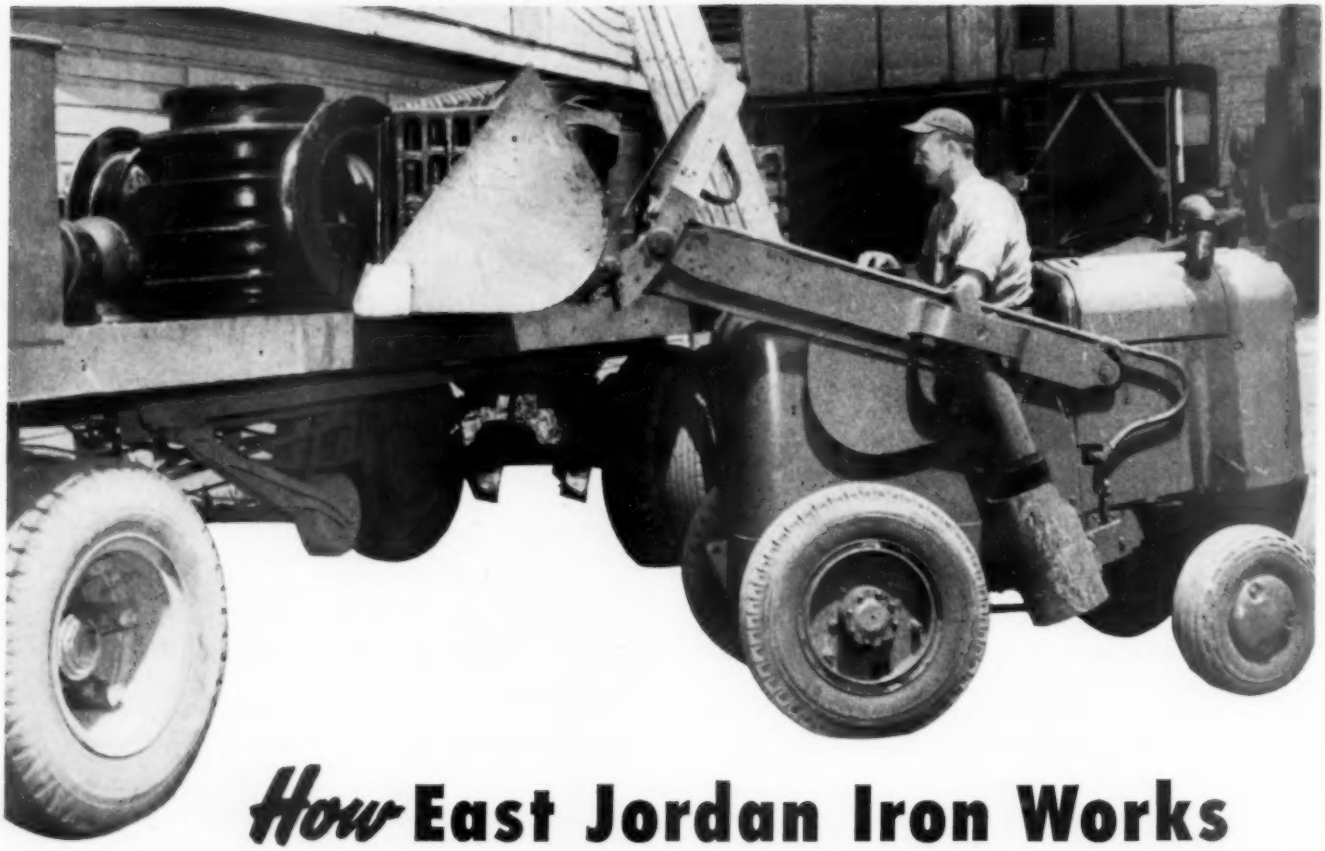
1. Cool and free-cutting qualities promote efficient production of burn-free finishes and close tolerances.
2. Uniform cutting qualities of V20 segments make possible close control of part size and finish and the establishment of controlled production rates.
3. Fast rates of cut obtained through the use of V20 segments save many dollars per year in operator and machine time on heavy production work.
4. More nearly self-dressing than other types, V20 segments offer savings in dressing time and usable abrasive.
5. Ability to grind a wide range of work of all sizes with larger table loads makes the surface grinder a more useful, efficient and profitable tool.
6. Successful use of V20 segments on nearly all types of metals including non-ferrous types makes possible reduced inventories in terms of gradings necessary for various types of work.
7. One grading can be used to grind a variety of materials successfully making it unnecessary to change segments when changing work thereby saving set-up time.

COATED PRODUCTS SHEETS • ROLLS • BELTS • DISCS SPECIAL SHAPES

BONDED PRODUCTS ABRASIVE WHEELS • STICKS, STONES AND RUBS • SPECIALTIES • SUPERFINISHING STONES • SPECIAL FORMS • ABRASIVE GRAINS AND FINISHING COMPOUNDS



FOR EVERY ABRASIVE APPLICATION
...CALL IN
CARBORUNDUM
TRADE MARK



How East Jordan Iron Works *Profits* with 3 PAYLOADERS

THE PROBLEM:

This foundry and metal working plant has to unload sand from cars and move it through all phases of foundry operations . . . dispose of old cores, carry castings from molding floor to cleaning room, to machine shop, to storage . . . move products from storage to docks and load them onto trucks and cars.

THE SOLUTION:

This company acquired its first payloader in 1947. "Today we have three units—all of them constantly busy and producing unexpected economies regularly," declares a company official. "One by one our basic problems have disappeared."

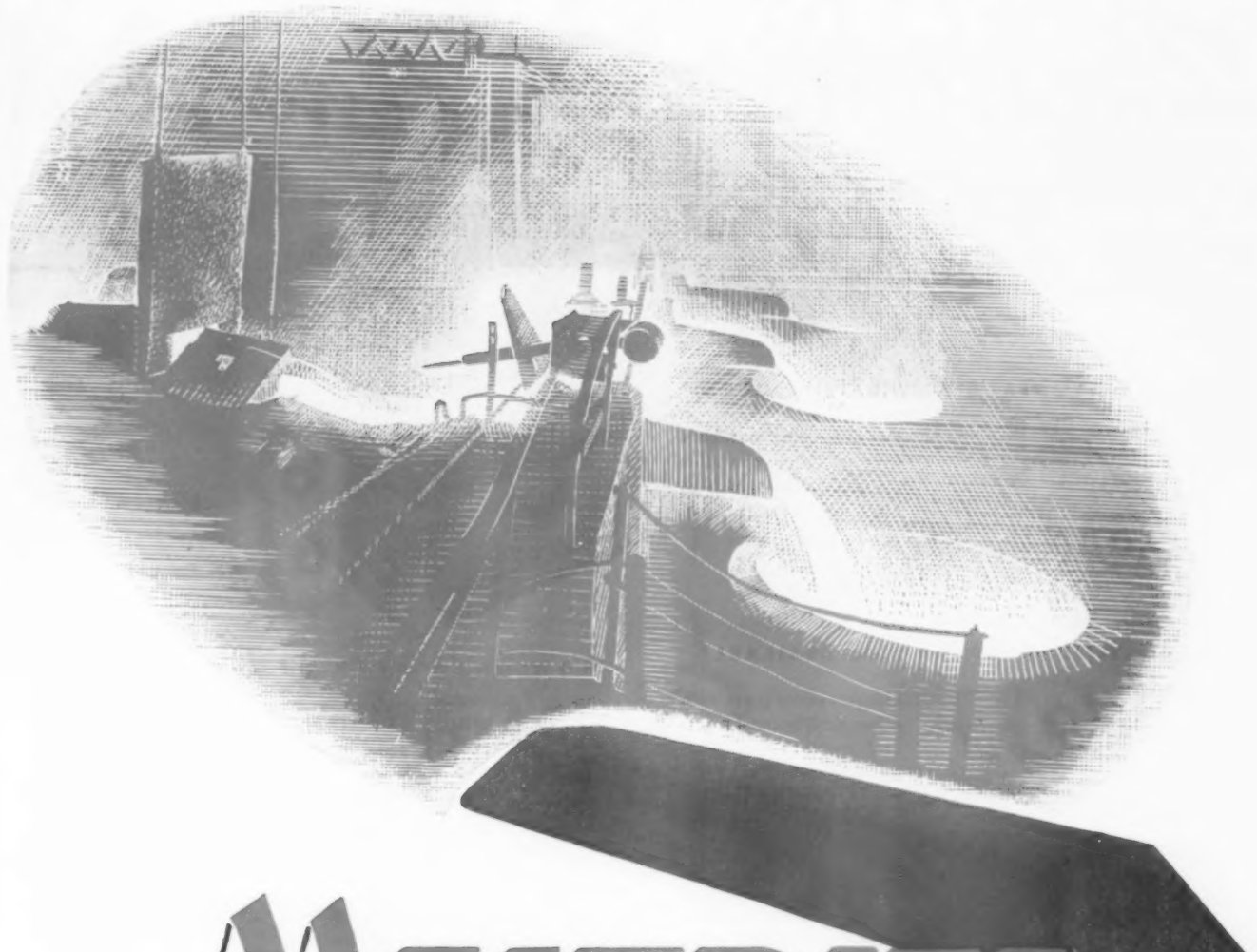
Handle Sand, Castings, Cores. The Payloaders unload incoming sand from cars. They perform all nightly clean-up operations including the complete handling of sand, castings and cores. In the daytime one Payloader feeds the muller and keeps all molding stations supplied with sand.

Investment Quickly Repaid. Payloaders also solved a difficult shipping problem. They pick up, carry and load finished castings from storage directly onto trucks thus avoiding delays, the construction of large expensive docks and the need for an extra crew of men. These Payloaders also remove snow, handle drums of molding bond, gasoline, etc., unload patterns from trucks and do many other money-saving jobs.

Thousands of other foundries and plants are using Payloaders with profit. Learn how they can save time, labor and money in your plant. Write The Frank G. Hough Co., 703 Sunnyside Avenue, Libertyville, Illinois.

GET YOUR COPY of Job Study No. 14. It's a complete authorized analysis of the performance of Payloaders at East Jordan Iron Works, East Jordan, Michigan.

HOUGH
PAYLOADER
Manufactured by THE FRANK G. HOUGH CO.



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SERVICE TO INDUSTRY

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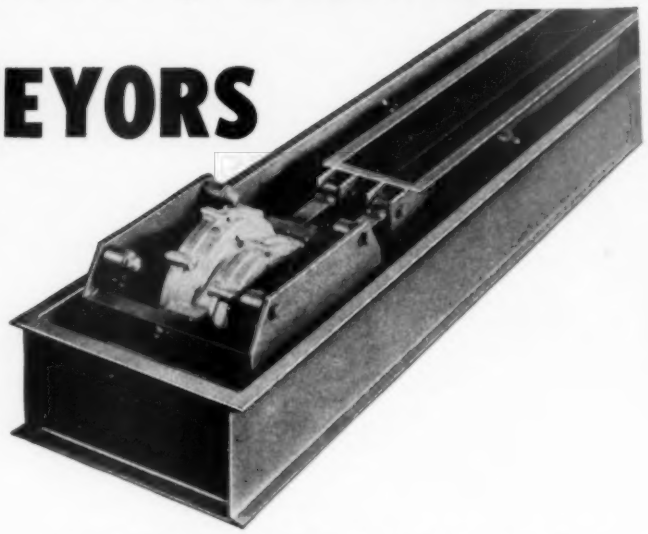
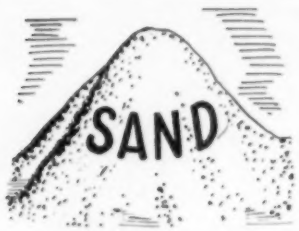
Questions and Answers about AJAX LO-VEYORS



WHAT MATERIALS CAN BE HANDLED?

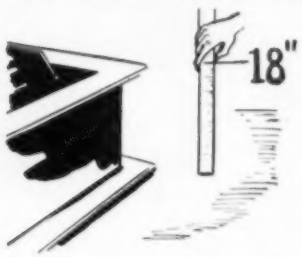


Dry aggregate materials ranging from granular up to 6" lumps such as sand and castings.

IS DUST-TIGHT OPERATION AVAILABLE?

Flat conveyor pans with cover and booted inlets and outlets and also gastight tubular conveyors permit handling materials without contamination or explosion

HOW MUCH HEAD ROOM IS REQUIRED?



Average overall height is less than 18" except for a short distance where shaker is mounted.

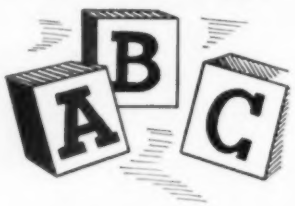
HOW DO AJAX LO-VEYORS REDUCE COSTS?

They eliminate moving materials by costly non-productive shovel and wheelbarrow methods.

ARE ABRASIVE CONDITIONS HARMFUL?

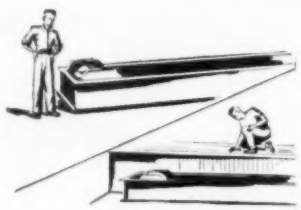
Unaffected by sand and abrasives, they are ideal for foundries, chemical plants, cement mills, etc.

HOW DOES AJAX REDUCE WEAR?



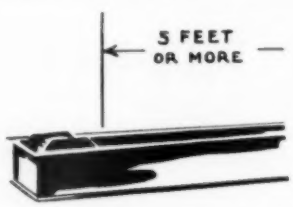
Reciprocating drive unit is completely enclosed. All eccentrics, idler pulleys and exposed bearings are eliminated.

CAN AJAX LO-VEYORS BE INSTALLED ANYWHERE?



They are self-contained units ready to set in place and use. Easily installed on or below floor or suspended from wall or ceiling.

CAN THEY BE USED FOR SHORT AND LONG CARRIES?



Lengths, widths and capacities to suit various materials, plant conditions and requirements of the process.

ARE AJAX LO-VEYORS ECONOMICAL?

They are economical to buy, operate and maintain.

•

Write telling us your material handling needs and Ajax engineers will make recommendations.

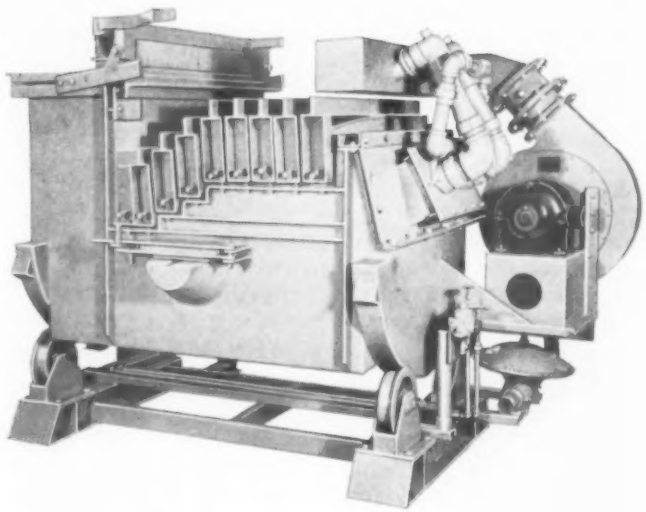
AJAX FLEXIBLE COUPLING CO. INC. WESTFIELD, N. Y.

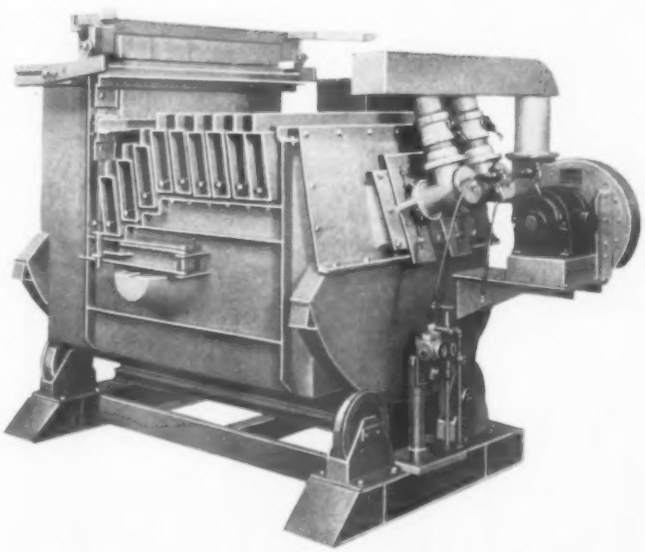
LOOK! GRAY IRON FOUNDRYMEN!

DAILY, PROFITABLE OPERATION DURING SLOW TIMES OR PEAK PERIODS WITH THESE SENSATIONAL NEW STROMAN ECONOMELT FURNACES

Here's What You Can Count On:

1. Flexibility
2. Controlled analysis of iron
3. Prompt service to customers
4. Control of physical properties
5. Turnover of molding floors and flask equipment several times daily
6. Full use of a minimum amount of labor
7. Temperatures in excess of 2800° F. easily attained
8. Excellent for use on special analysis and alloy irons
9. Sizes up to 5000 lbs. capacity per heat





Being able to pour off your floors several times daily eliminates the necessity of bringing in a full crew of men to keep an iron foundry operating daily. With an Economelt all that is needed is a short preheating period at the beginning of each day. One and one-half hours after the first charge molten metal will be ready to pour into the molds. This means that the molding floor and flask equipment can be turned over several times a day, enabling you to give your customers excellent service.

Chemical analysis can be controlled very closely with Stroman Economelt Furnaces, therefore affording good physical properties on all castings. This assures your customers of a good machinable product. With this unit you can meet competition with a quality product and maintain low production costs, which assure greater profits.

INVESTIGATE these Stroman Economelt Furnaces for Gray Iron . . . they have proved their efficiency and are now in operation in many gray iron foundries . . . Drop a note for full information . . . Do it to-day.

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LET'S KICK IT AROUND

By
TOM BARLOW

Life is real, life is earnest.
Making scrap is not its goal.
While we're playing with the gating
Do away with that dirt-hole!

—Apologies to everybody.

Before writing this pseudo dissertation on gating, I spent three days with my feet on the desk—thinking. Now the boss is back from Texas, so I have to go to work. All that thinking was not necessary to say something about gates—from from it. My real worry was how to write about gates and still say something about our lovely, lovely products, which don't have a darn thing to do with gates. After all, if we don't sell Bentonite (Black Hills), Dixie Bond, Revivo and all the other junk we carry, we don't make any money. If we don't make money, I don't get paid. If I don't get paid, I quit. If I quit, who will write this stuff? (And how will I eat?)

Last month (you were here last month, weren't you?) we suggested the need for reducing scrap. The first thing we notice is that the scrap report doesn't say anything about how to cure a defect. It says we had so many shrinks, blows, dirt holes, scabs, run-outs, etc. Wouldn't it be easy if the scrap report listed defects by: "Can be cured by gates", "Can be cured by sand", "Can be cured by equipment", etc.? I'll bet that you will find that a good percentage come under the heading "can be cured by gates".

Did I hear some one say, "That's the way we always gated that job"? So what? Did you know that over 60% of the prescriptions filled by druggists today call for drugs that didn't even exist ten years ago? I know a lot of things I could do ten years ago that I can't do now, but let's stick to gates.

One of the common troubles with gates is a backwards proportion of gates, runner and downsprue. Let's kick *that* around for a while. We all know that if we don't keep the sprue up while pouring, we can get dirt or slag in the casting. Dirt and slag can float to the top only if there is something to float on. Let's apply the same thinking to the runner and ingate. What will happen if we keep the sprue filled, but the sprue doesn't keep the runner filled? Or if the runner doesn't keep the ingate full? That's right—we get dirt. Maybe we also get blows and shrinks.

To keep something full that has a hole in it, we must put in as fast as we take out—or faster. So, if we have a number of ingates of a certain size, the runner must be large enough to keep the gates full. The easy way to keep the gates full is to make the runner larger than the gates. One common figure says that the area of the runner should be 1.2 times as large as the *total area* of the ingates. Do all your jobs meet this requirement?

S= 1.2XI

Now that we have the runner large enough to keep the gates full, the next step is make sure that the runner stays full. That's easy—the *area* of the down sprue should be larger than the area of the runner or runners. Let's say it should be 1.2 times as large as the runner or 1.4 times as large as the combined area of all the ingates.

S= 1.4XR

CUTS OR SPALLS?

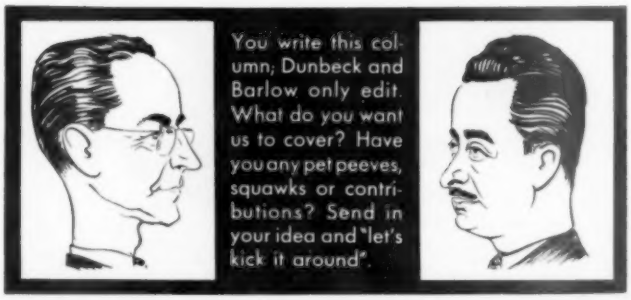
Now we have a positive pressure system. So some one objects that such a system will cause cuts and washes, when he already has too many. Actually, many marks that look like cut or washed gates are really spalls or scabs. If metal is allowed to flow through a runner without filling the runner, the cope surface will spall or scab and leave a mark that looks like a cut. More dirt comes from gates that are "backwards" than from those that are properly and progressively choked.

WASHES OR SCABS?

Next objection? Oh, yes, the man says that if he makes his runner larger than the total of all gates leading from the runner, and makes the sprue larger than the runner, his sprue will be so big he can't hold it up. That's a tough one. When true it means either that the gates are larger than needed or that there are too many castings on one runner. "Ah", he says, "if he makes the gates smaller he gets cold-shuts!" Probably so, if he uses a negative pressure system, but will he if a positive pressure system is used? Don't forget you only put as much metal through the gates as you put down the sprue. Making the gates larger won't get metal into the mold faster unless it comes down the sprue faster.

★ ★ ★

EASTERN CLAY PRODUCTS, Inc.
"Bonding clays sold with service"
JACKSON, OHIO


You write this column; Dunbeck and Barlow only edit. What do you want us to cover? Have you any pet peeves, squawks or contributions? Send in your idea and "let's kick it around".

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- ONE MOTOR REQUIRED
- HAND DRAW BIN OPTIONAL
- ADDITIONAL CONDITIONING

Right hand type shown (can be L.H.)

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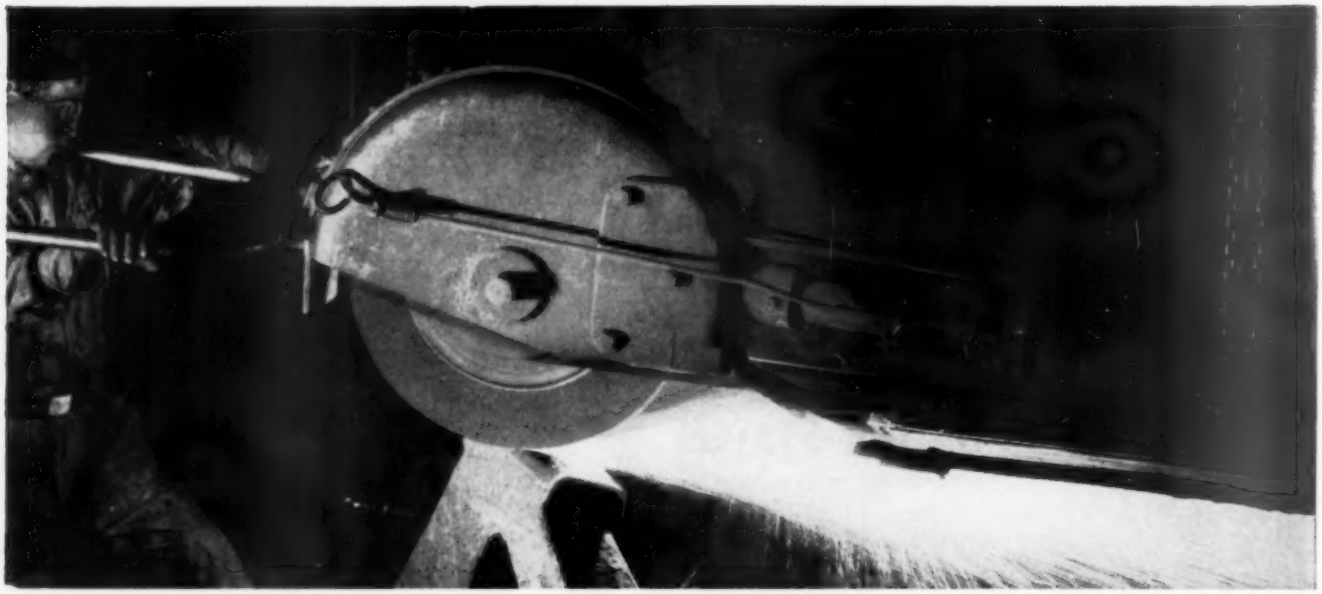

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- 2-SPEED-V-BELT DRIVE FOR 16" 20" and 24" HIGH SPEED WHEELS
- GUARDS OF BOILER PLATE STEEL
- WHEELS CHANGED EASILY AND QUICKLY
- BALL-BEARING TOTALLY ENCLOSED, FAN COOLED MOTOR
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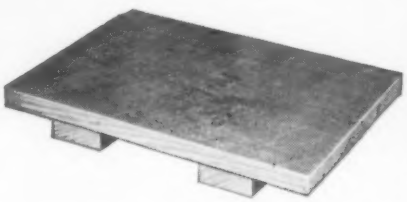
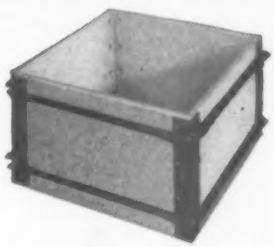
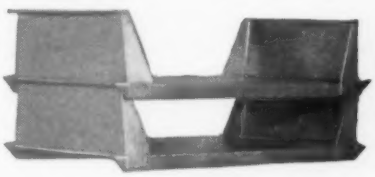


CMD WOOD BOTTOM BOARDS
All sizes and shapes



CMD NON-WARP, NON-BURN SLIP JACKETS



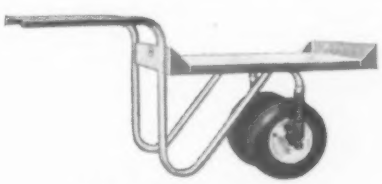
CMD DUAL-PURPOSE CORE TRAYS

CMD TYPE F CHIPPING HAMMER
Metal handle. Head has 2 chisels at right angles

CMD TYPE A CHIPPING HAMMER
Combination drift and chisel

CMD TYPE C CHIPPING HAMMER
For general hand chipping

TEXTITE AIR SEPARATOR
Cools, cleans and dries the air in one operation. *No moving parts.* Saves air tools. Nothing to replace.



CMD PNEUMATIC CORE BARROWS
With single wheel or two wheels. (as shown here)

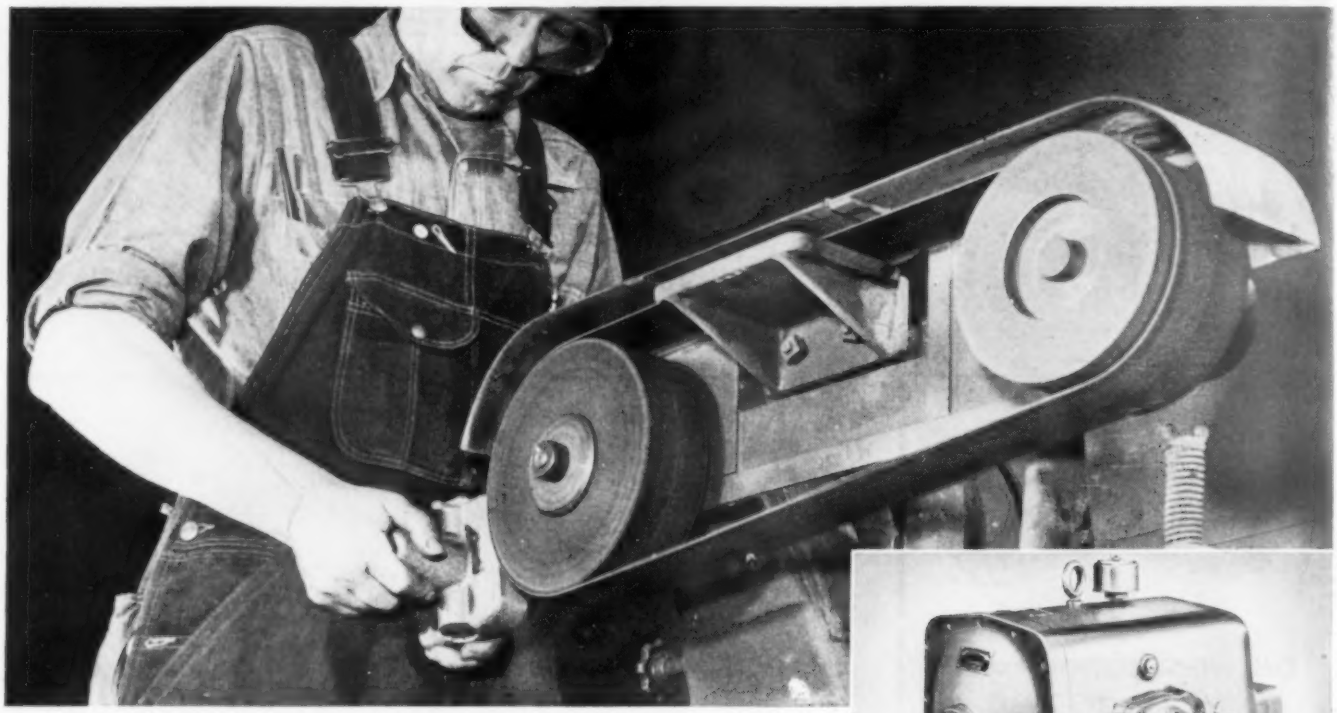
CMD PNEUMATIC CORE TRUCKS
Minimize core chafing and breakage

WRITE FOR BULLETINS
On CMD core-conveying equipment and other foundry specialties—preferred by experienced foundrymen for 25 years.

CHICAGO MANUFACTURING & DISTRIBUTING COMPANY

1928 WEST 46th STREET CHICAGO 9, ILLINOIS

ANOTHER 3M COMPANY SERVICE STORY



QUICK, SMOOTH FINISH for brass and bronze castings with this inexpensive bench backstand grinding unit. Tri-M-ite Cloth Belts backed with a "K" Contact Wheel have speeded metal finishing over three times as fast as previous equipment.

OILGEAR 35 HP TWO-WAY VARIABLE DELIVERY PUMP—typical of the products being turned out *faster* with the help of belt grinding.

Belt grinder pays for itself in one month!

When a 3M Methods Engineer suggested a bench backstand grinder for grinding and finishing brass, bronze and steel castings, steel plates and bar stock at The Oilgear Company, Milwaukee; he may have used the familiar phrase, "It'll pay for itself."

This large user of steel plates, bar stock, forgings and castings gave our Engineer a chance to prove this statement . . . and the equipment saved its original cost during its FIRST month of operation.

Recapturing the cost of a unit of plant equipment in one month is unusual, but we can point out hundreds of users throughout the country who have cut grinding and finishing costs and stepped-up production three to four times over previous methods.

If you grind or finish metals, plastics, wood or glass, flat or contoured surfaces, you'll want more information on this production line cost-cutter—Belt Grinding. The coupon below will bring you an informative booklet and, if you like, the services of a 3M Methods Engineer to help analyze your operations. No obligation, of course.

Made in U.S.A. by MINNESOTA MINING & MFG. CO., *St. Paul 6, Minn.*
Also makers of "Scotch" pressure-sensitive tapes, "Underseal", "Scotchlite", "3M" Adhesives.

Please send me a copy of your booklet "Step Up Production".
Please send a 3M Methods Engineer to call on me.

F-949

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General Export: DUREX ABRASIVES CORP., *New Rochelle, N. Y.* *In Canada:* CANADIAN DUREX ABRASIVES LTD., *Brantford, Ontario*

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TOUGH enough:

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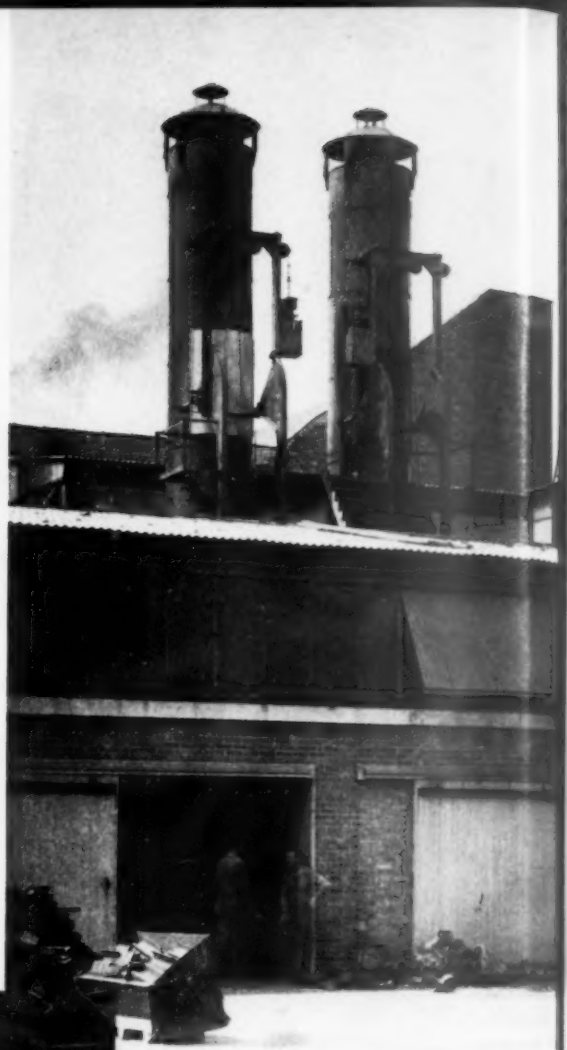
ARE BENEFITING FROM WHITING-ENGINEERED MECHANICAL CHARGING

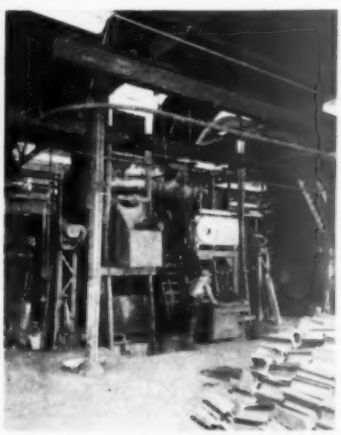
TODAY, mechanical charging is reducing costs and improving working conditions in scores of smaller foundries —plants which pour no more than 5 to 25 tons per day. No need to envy the "big fellows" . . . Whiting engineers will gladly show how YOU can use mechanization economically and profitably.

Whiting Charging Installations begin with simple skip hoists, bucket loaders, and other inexpensive equipment that small foundries can use to advantage. No operation is too small to receive our careful attention. Why not ask for our suggestions?



These two Whiting #4 Cupolas are served by side-dump skip hoist chargers

Bottom-dump scale-lorry suspended from monorail . . . shown in material yard



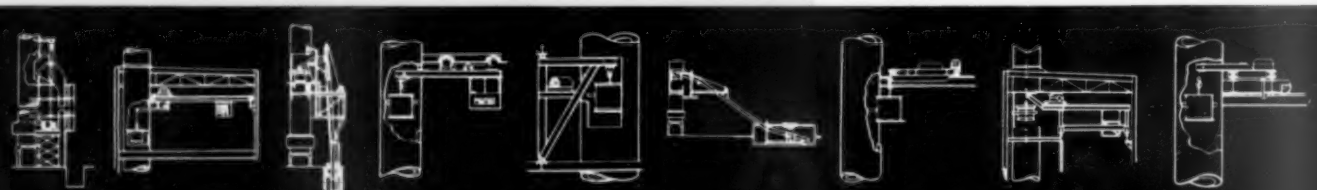
Here the monorail lorry discharges into the skip hoist charging bucket

WHITING CORPORATION

15607 Lathrop Ave., Harvey, Illinois

Offices in Chicago, Cincinnati, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, and St. Louis. Agents in other principal cities. Canadian Subsidiary: Whiting Corporation (Canada) Ltd., Toronto, Ontario. Export Department: 30 Church St., New York 7, N. Y.

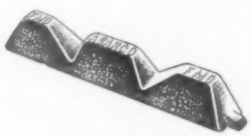
WHITING MAKES ALL TYPES OF MECHANICAL CHARGERS



SIDE-DUMP SKIP | UNDERSLUNG CRANE | "VM" SKIP | MONORAIL CRANE | JIB CRANE | SWIVEL SKIP | HORSESHOE TROLLEY | GANTRY CRANE | OVERHUNG CRANE

Photo by Toby Chadwick JMLeo F131

Profitable New Product Invented by Foundry...



A sound idea, engineering skill, and the *right* Federated metals for its cast components are combined in the LITTCO ELECTRIC MOWER, manufactured by the Littlestown Hardware and Foundry Company, Inc., Littlestown, Pa.

Competent design and liberal use of castings made of Federated aluminum alloys have resulted in the production of a 24 lb. electric lawn mower which, although it requires only one hand to operate, will cut grass up to 15 inches high with no trouble.

Eighteen parts of the mower, including the sides, the housing, wheels, back rollers and brackets, are cast of Federated TENZALOY and Federated F-720, the former being used where extra high strength is demanded.

TENZALOY is produced only by Federated Metals. It is an aluminum alloy which gives high strength without heat treatment, as-cast strengths reaching 30,000 psi., and still higher with 10-14 days aging at room temperature.

For TENZALOY . . . for any non-ferrous alloy, including aluminum, magnesium and copper-base foundry metals; solders; bearing metals; and fabricated lead products . . . see Federated first.

Federated first in the non ferrous field FMD

Federated METALS DIVISION

AMERICAN SMELTING AND REFINING COMPANY, 120 BROADWAY, NEW YORK 5, N.Y.

BETTER CASTINGS...DIRECT SAVINGS quickly pay for COLEMAN core and mold OVENS

● **REDUCE YOUR OPERATING COSTS** by replacing obsolete, inefficient core and mold ovens with Coleman Ovens. Why waste money using worn-out ovens? Install Coleman Ovens which quickly pay for themselves through immediate direct savings—savings which start in the core room and molding department and end up with perfect castings! It will pay you to investigate Coleman Ovens today because of these vitally important cost-saving advantages:

DEPENDABLE BAKING AND DRYING. All guesswork in core baking and mold drying removed. Rejects and make-overs eliminated.

INCREASED LABOR SAVING. Efficient and modern mechanical designs reduce handling and other indirect labor to a minimum.

HEAVY DUTY CONSTRUCTION. Responsible for dependable performance, economical operation, and minimum maintenance cost.

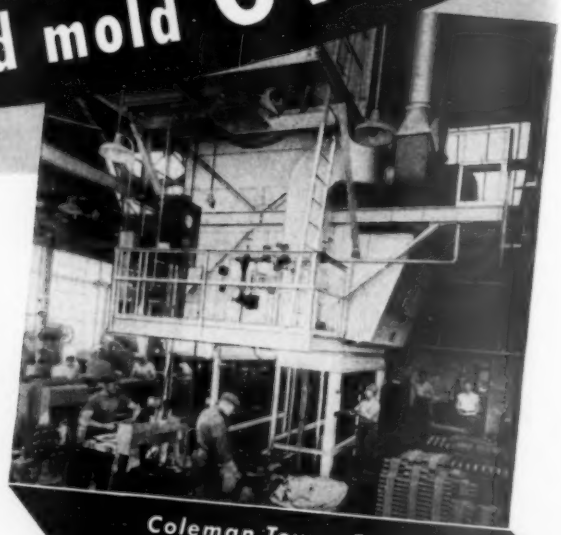
MAXIMUM FUEL ECONOMY. Coleman Heating Systems use the most economical fuel available to you—gas, oil, stoker-coal, electricity, etc.

BETTER WORKING CONDITIONS. Positive ventilation built into Coleman Ovens prevents leakage of fumes and gases—helps to make the core department a better place to work.

COMPLETE RANGE OF TYPES AND SIZES to meet every need.

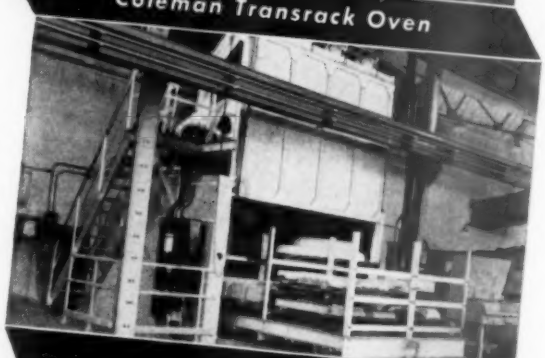
ADVANCED OVEN KNOW-HOW. Coleman Engineers have pioneered and developed the most efficient foundry oven designs. We will gladly study your operating conditions and recommend the type of Coleman Oven that will do your work at the lowest cost for fuel and labor.

Write today for Bulletin 48



Coleman Tower Oven

Coleman Transrack Oven



Coleman Car-Type Oven

Coleman Rolling Drawer Oven

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1831 COLUMBUS ROAD CLEVELAND 13, OHIO

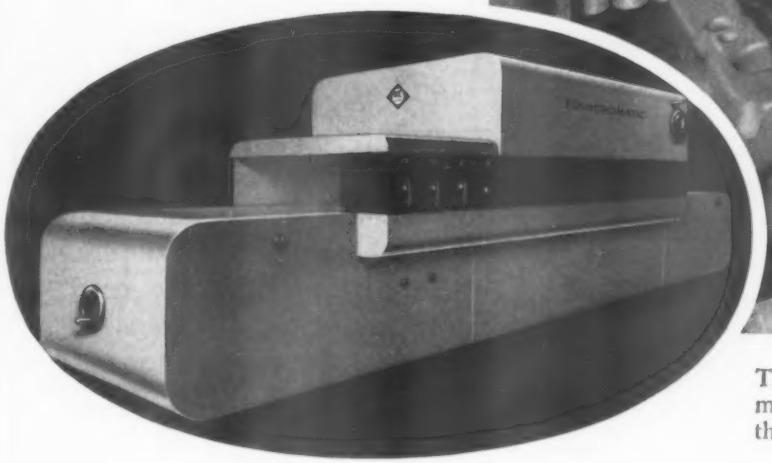
World's Oldest and Largest Foundry Oven Specialists

OVER 10,000 SUCCESSFUL INSTALLATIONS

80% LESS TIME TO DRY SAND CORES!

NEW DIELECTRIC CORE DRYER

- *Eliminates Excess Heat*
- *Cuts Space Requirements*
- *Reduces Casting Rejects*
- *Slashes Handling Time*



This 21-lb core dried in 12 minutes . . . only 30 minutes from core bench to molding. And 26 of these cores (546-lbs) can be dried in one hour.

NEW *FOUNDROMATIC* SAND CORE DRYER — BUILT BY ALLIS-CHALMERS SAVES TIME — IMPROVES CASTINGS

CORES MOVE directly from the core maker onto the conveyor belt of the *Foundromatic* dryer. When the cores come out of the dryer, they're hard, cool, ready-to-use. No additional curing or steam-out time is required. Cores may be handled with bare hands. All the unpleasantness of working with hot cores is eliminated. Electrode spacing is adjustable to handle cores ranging in height from 2 to 15 in.

Allis-Chalmers own huge foundries were the testing ground for the new unit. A-C foundry and electronic engineers co-operated in applying the time-tested principle of dielectric heating to special foundry requirements.

SEE NEW CORE DRYER OPERATE

Visit Allis-Chalmers foundries and see the new unit in operation. Arrange with your nearby A-C representative, or write direct Electronic Section, Milwaukee. See at first hand the savings possible in space, time and handling with the new core dryer.

Foundromatic is an Allis-Chalmers trademark.

ALLIS-CHALMERS

SEND FOR DETAILS

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MILWAUKEE, WIS.

Send me information on new *Foundromatic* Sand Core Dryer.

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Title.....

Company.....

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City.....State.....

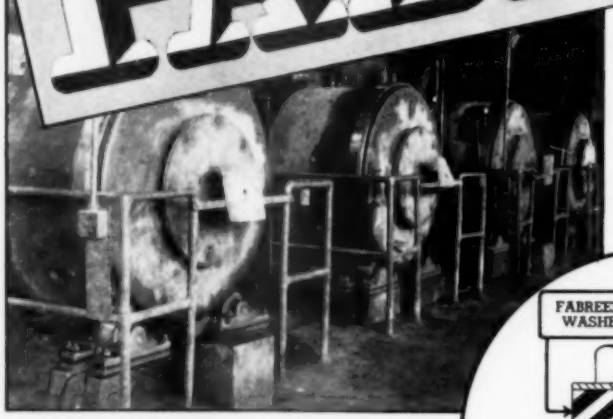
A 2796

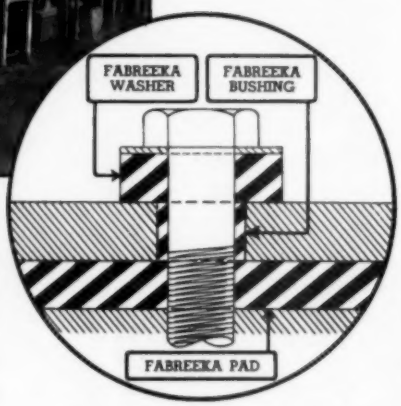
Under All Heavy Machinery

FABREEKA

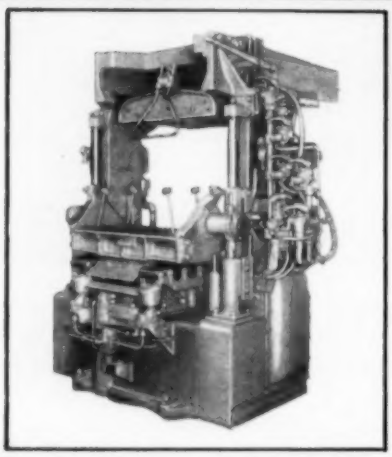
PADS, BUSHINGS, and WASHERS

Absorb Impact Shock and Reduce the Effect of Destructive Vibration



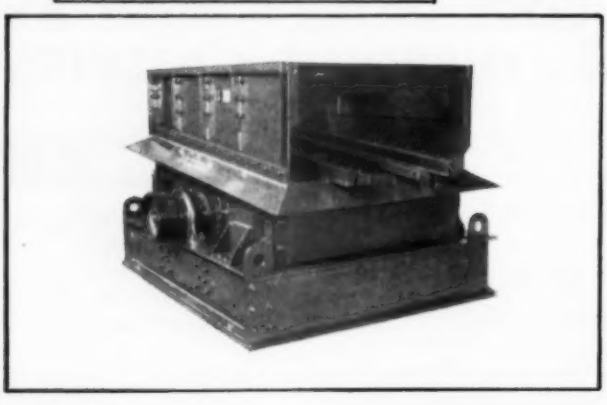


SHOWN AT LEFT
CROSS SECTION OF
FABREEKA INSTALLATION



FABREEKA Pads, bushings, and washers are installed under Shakeout Machines, Jolt Moulders, Tumbling Barrels and other heavy machinery to reduce the effects of heavy impact shocks and destructive vibration.

FABREEKA has demonstrated its ability to prevent breakage of machine parts and to keep bolts tight, thereby reducing maintenance and increasing production. In addition to these important advantages, Fabreeka has long life, which makes its final cost a low cost.



Write for latest literature

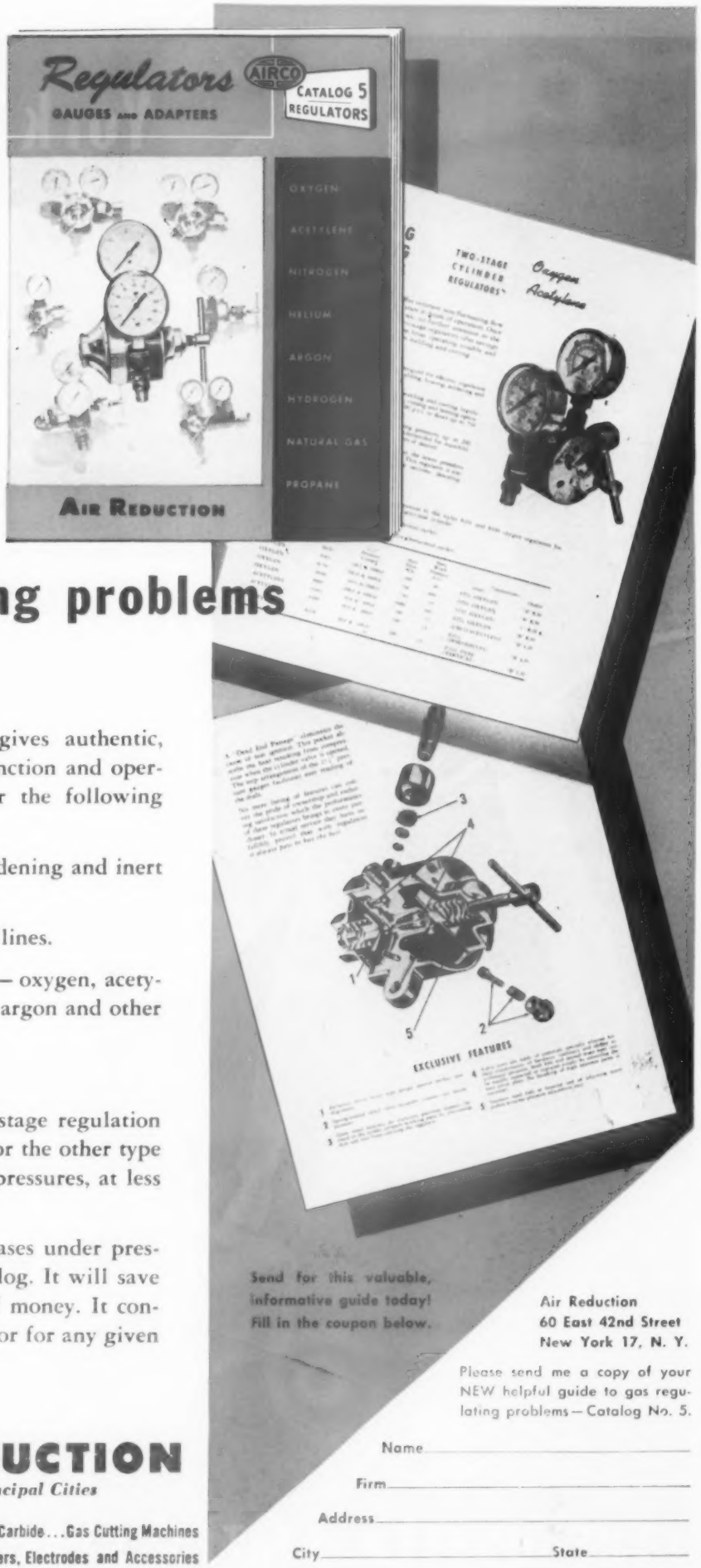
It Pays To Specify Fabreeka

FABREEKA PRODUCTS COMPANY, INCORPORATED
222B Summer Street
Boston 10, Mass.

for IMPACT SHOCK and VIBRATION

NEW HELPFUL GUIDE

to gas regulating problems



This new Airco Regulator catalog gives authentic, understandable information on the function and operating characteristics of regulators for the following types of service –

- for welding, cutting, heating, hardening and inert shielded arc welding.
- on cylinders, manifolds and pipe lines.
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- dual stage regulation . . . single stage regulation – and a quick "reason why" one or the other type would give you desired uniform pressures, at less cost, for a particular job.

Everyone concerned with regulating gases under pressure will find use for this helpful catalog. It will save him time, effort and needless waste of money. It contains data regarding the proper regulator for any given type of job.

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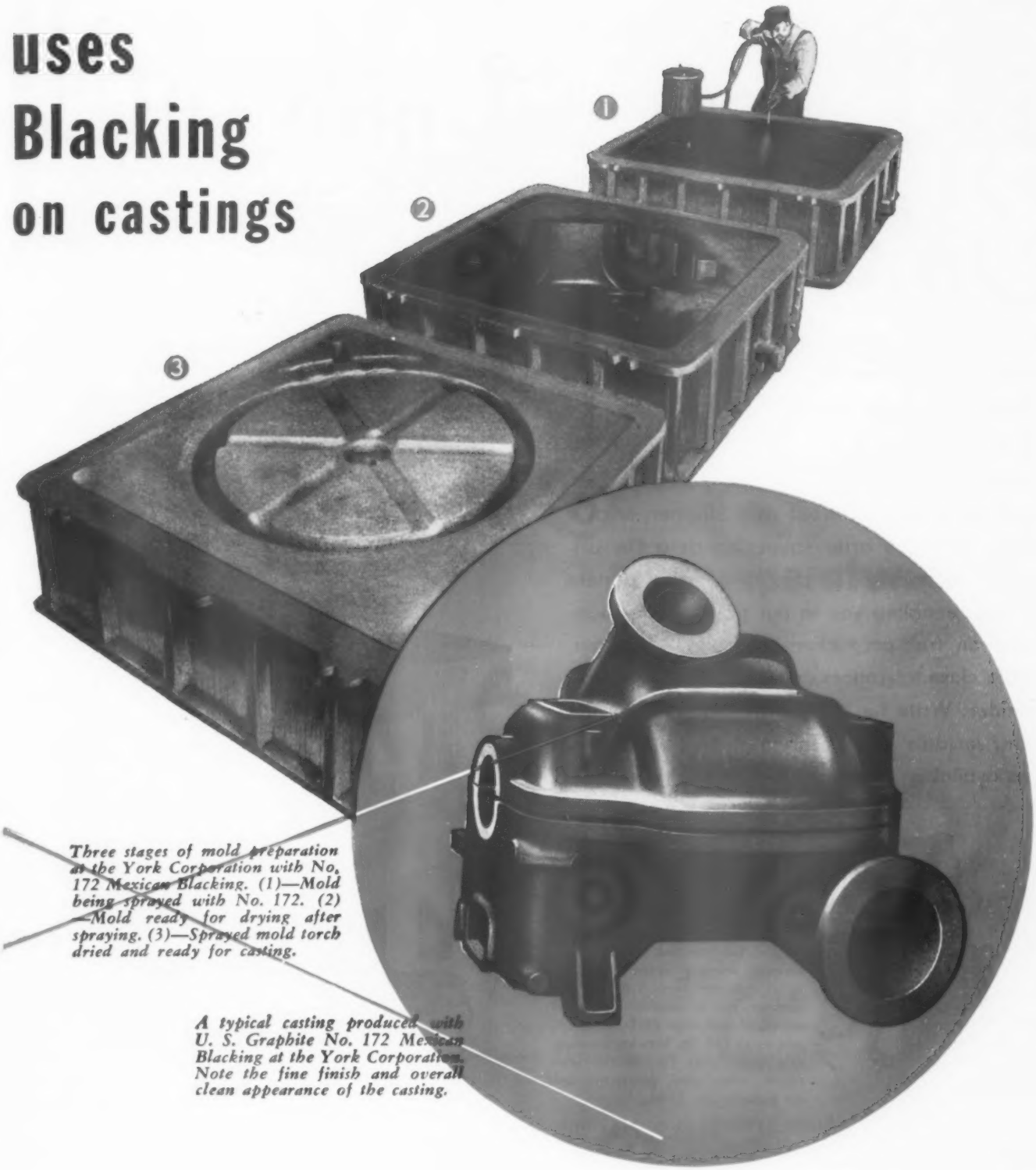
York Corporation
No. 172 Mexican
for finer finish
The York Corporation, manufacturer of refrigeration and air conditioning units, and operator of large iron foundries, is a regular user of No. 172 Mexican Blacking to produce castings with a *better finish and reduce foundry production costs.* No. 172 is a high quality wet blacking, containing a binder, that can easily be applied to cores and dry sand molds with spray, brush, or swab. It permits the sand to peel freely, leaving a smooth-surfaced casting *that requires minimum cleaning.* No. 172 Mexican Blacking is recommended for medium, extra large and pressure castings weighing 1 to 25 tons. No. 172 is also an excellent core coating. Only water is required to prepare for use. Other Mexican Graphite products include Cordip —for dipping or spraying dry or green sand cores— and Mexacote—for cores and molds in light and medium production casting where extra resistance to high temperature metal is demanded.
THE UNITED STATES GRAPHITE COMPANY

uses Blacking on castings

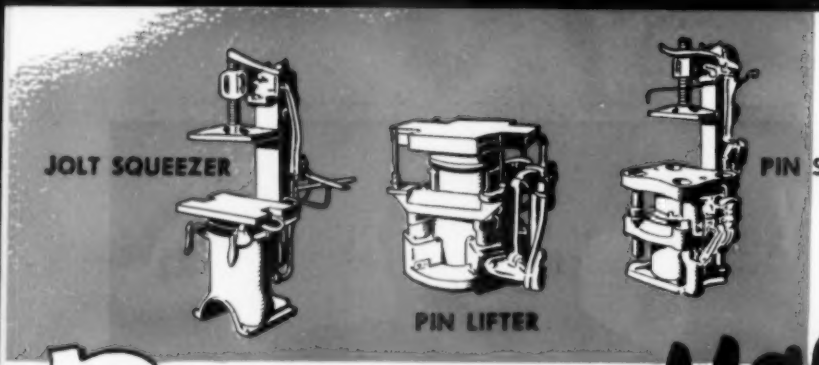


Three stages of mold preparation at the York Corporation with No. 172 Mexican Blacking. (1)—Mold being sprayed with No. 172. (2)—Mold ready for drying after spraying. (3)—Sprayed mold torch dried and ready for casting.

A typical casting produced with U. S. Graphite No. 172 Mexican Blacking at the York Corporation. Note the fine finish and overall clean appearance of the casting.

No. 172 Mexican Blacking

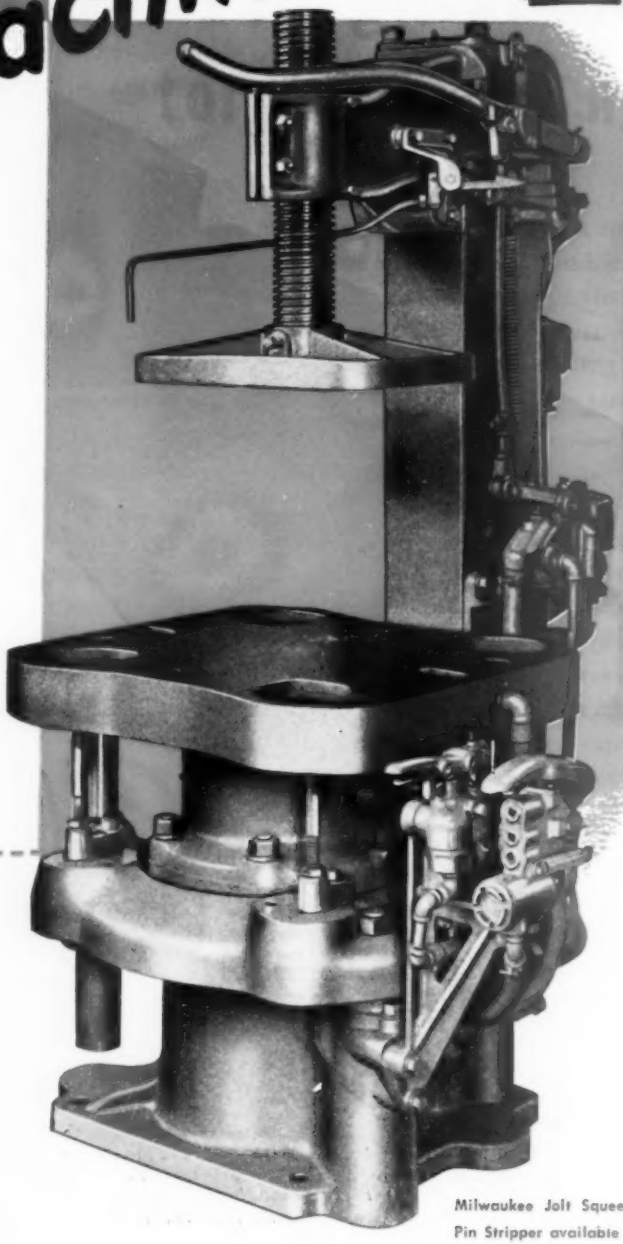
DIVISION OF THE WICKES CORPORATION • SAGINAW, MICHIGAN



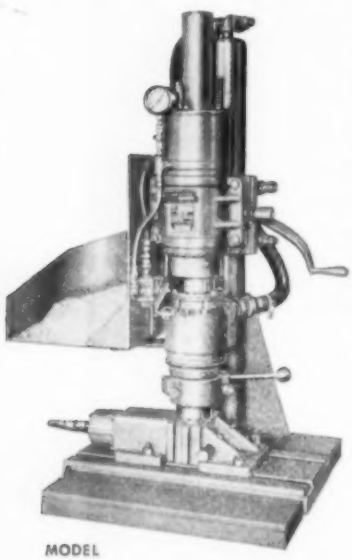
3 Molding Machines in 1

Here's a molding machine that's really versatile. The Milwaukee Jolt Squeeze Pin Stripper operates as a Jolt Squeezer . . . Pin Lifter . . . or Pin Stripper. It's like having three molding machines in one.

The drawing mechanism can be operated on the exhaust of the squeezing stroke as a Stripper, or as a separate operation after squeezing as a Pin Lift. The machine handles simple, inexpensive pattern equipment, enabling you to put troublesome short-run jobs on fast production schedules. It is machined to close tolerances and is accessible from all three sides. Write for complete information on this modern, versatile "Triple Threat" molding machine. 5 sizes available. Ask for Bulletin No. 110.



Milwaukee Jolt Squeeze Pin Stripper available in 5 sizes.



MODEL NO. 3A

30% More Blow Pressure with Milwaukee-Taccone Bench Style Core Blower

This modern, bench style machine blows intricate cores up to 4 lbs. in weight. Synchronized clamping and blowing increase speed and efficiency. Blown cores automatically released, can be removed as fast as blown. Blower steps 90 lb. line pressure up to 120 lbs. blowing pressure. Also heavy duty Core Blower with 100% more blow pressure. Ask for Bulletin No. 119A.

Piston Size Calculator

Milwaukee Foundry Equipment Engineers have devised this handy calculator for determining the uniform mold hardness and size of squeeze piston. It's FREE! Send for your Calculator — today!

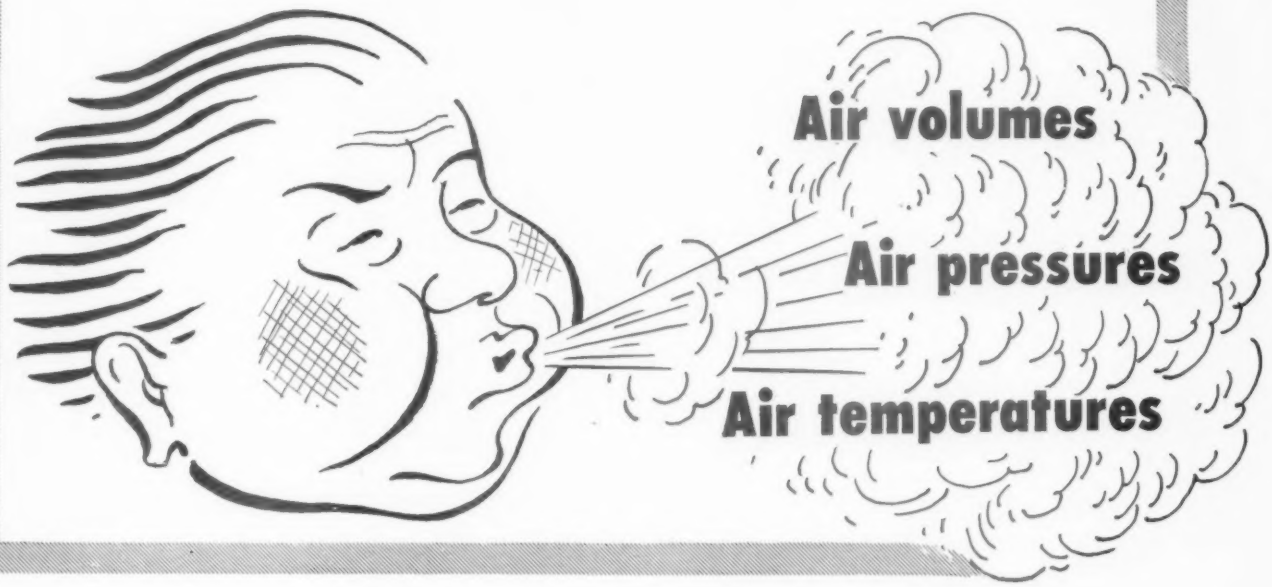
CORE BLOWERS • CORE GRINDERS • MOLDING MACHINES • BRIQUETTING PRESSES

MILWAUKEE Foundry Equipment Co.

3236 W. PIERCE STREET, MILWAUKEE 4, WISCONSIN, U.S.A.

You're way ahead... when you

CONTROL ALL 3



IT'S more economical to go *all the way* in providing control for your cupola . . . partial measures produce only partial results.

Accurate measurement and control of Air Volumes, Pressures and Temperatures will give you better heats, more uniform melting and higher pouring temperatures.

And you're way ahead when you *control all 3* with Brown instruments.

- ★ Brown Pressure Gauges for Blast Pressure.
- ★ Brown Flow Meters for Air Volumes.
- ★ Brown Thermometers for automatic maintenance of Air Temperature.

Call in your local Honeywell engineer for detailed information and a discussion of increased efficiency for your cupola operation.

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Round Flasks and

. . . SAVES TIME AND SA

THE HINES

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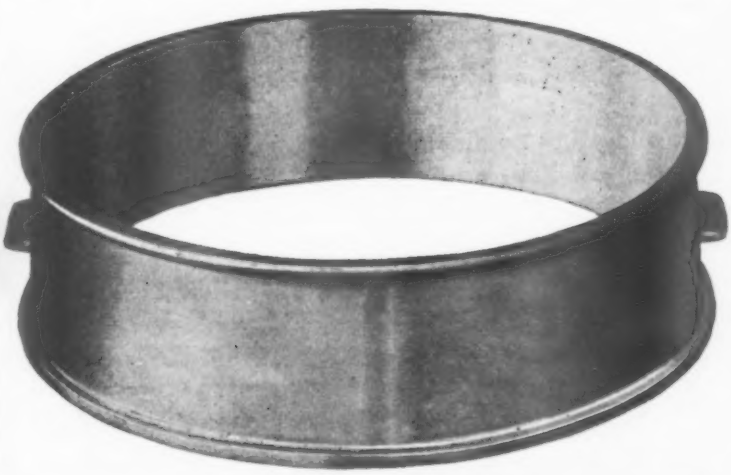
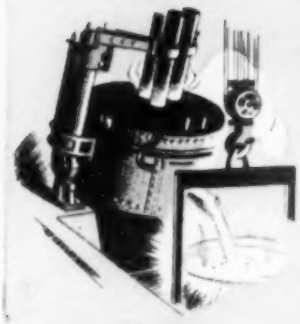
Jackets by Hines

ND SAND ON THESE JOBS



S FLASK CO.

CLEVELAND 11, OHIO



Steelmakers are called upon to meet increasingly exacting requirements for cleanliness, quality, and chemical composition of steel. To help steelmakers produce these better steels, ELECTROMET has worked constantly to produce better ferro-alloys. Here are some of the reasons . . .

..why

"ELECTROMET" Alloys

Trade-Mark

are preferred

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ELECTROMET's specifications and dependable chemical analysis permit the use of the average analysis in calculating charges. In every shipment of ELECTROMET ferro-alloys, you obtain a uniform product resulting from close metallurgical and physical control.

2 WIDE RANGE OF SIZES

An adequate range of sizes, for both lump and crushed material, allows you to select the size best suited to your scale of operations and type of melting facilities for open hearth, electric furnace, or foundry.

3 GOOD SERVICE

ELECTROMET alloys are available for immediate shipment from plants and warehouses that are conveniently located to serve you. Sufficient stocks are kept on hand to meet the varied requirements of ferro-alloy users. Our staff of experienced metallurgical engineers is always ready to give technical help where needed.

The word "Electromet" is a registered trade-mark of Union Carbide and Carbon Corporation

Write for our new catalog "Electromet Ferro-Alloys and Metals." It describes over 50 metals and alloys produced by ELECTROMET and tells of the unique technical service offered to the metal industries.

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Complete Line of Material Handling, Processing and Mining Equipment

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Remove excess metal faster with CLECO Grinders and Sanders

For more work in less time, CLECO Grinders and Sanders are preferred. High power, perfect balance and smoother operation result in lowest costs through increased speed and reduced operator fatigue. The other CLECO features listed at the right result in long life and reduced maintenance. Write for full information.

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- **Governor controls motor speed at all loads — reducing air consumption.**
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CLECO Grinders and Sanders are made in all sizes — for fine tool and die work or heavy duty production grinding. Write for full information.

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Grinders — Sanders — Rotary Drills
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Air power is safe, clean, flexible and highly productive. For air-powered tools built to highest quality standards, insist on CLECO air tools, bearing this familiar trade mark

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Back of CLECO Products . . . with 25 years experience in precision manufacturing, is the REED ROLLER BIT COMPANY, one of the largest companies of its kind in the world.

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GRITTY SAND . . . HEAT . . . SHOCK LOADS all combine to make this foundry breaker belt conveyor drive a tough assignment! But *Texrope* Super-7 V-belts on *Texrope* sheaves in this foundry are giving reliable, economical service.

Tough double covers stand up in foundry atmosphere full of abrasive dust. Specially selected rubber compounds are highly resistant to foundry heat and shock. Powerful structure of high tensile strength cord carries the load.

Why TEXROPE is the Greatest Name in V-Belt Drives!

Texrope originated the multiple V-belt drive for industry and more *Texrope* multiple V-drives have been installed than any other kind. Today, *Texrope* gives you everything you need in V-belt drive equipment . . . Super-7 belts . . . fixed and variable speed sheaves . . . and speed changers.

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Vast *Texrope* experience has been condensed into a 144 page book that enables you to engineer 90% of all V-belt drives yourself. See your Allis-Chalmers Authorized Dealer or Sales Office or write for Bulletin 20B6956.

Texrope Super 7 V-belts result from the cooperative research of the Allis-Chalmers and B. F. Goodrich companies; and are sold only by Allis-Chalmers dealers and offices. A-2776

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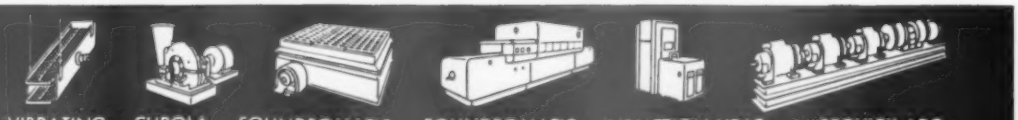
Foundry Equipment for Bigger Output-Better Working Conditions!



Powder-Cutting

Steps Up Production of Stainless Steel Castings 32 Times . . .

Centrifugally-cast rings of stainless steel are cut in 15 minutes time, increasing production 32 times.

Riser cutting of centrifugally-cast stainless steel rings used to be a difficult and time-consuming job. In one foundry which used a boring machine, this operation took eight hours per casting. When powder-cutting was introduced, the time was reduced to approximately 15 minutes—a 32-fold increase in production.

In another foundry, powder-cutting was profitably used to remove ⅜ to 1 in. of metal from stainless steel castings. The machining cost for this type of work has been $24.00 per casting. Substitution of powder-cutting brought the overall cost, including finish-grinding and chipping, to $7.53 per casting, and reduced the time from 8 hours to 1 hour. For an order of 60 castings, the foundry saved $988.20 and 360 hours of operating time.

If you have stainless steel or other oxidation-resistant metals to cut, LINDE'S service engineers can show you how powder-cutting methods can be used with profit. Phone or write the nearest LINDE office.

Here, risers on stainless steel castings are being powder-cut—a time saving of 30 per cent over the former methods.

Linde
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Unit of Union Carbide and Carbon Corporation

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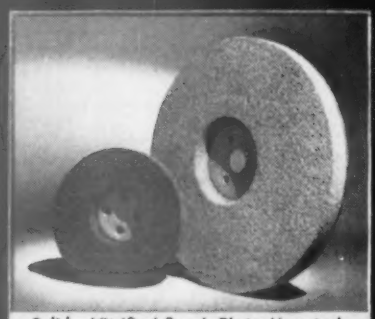
The word "Linde" is a registered trade-mark of The Linde Air Products Company

4 Reasons Why NORTON *Vitrified* Discs Can Cut Your Grinding Costs—

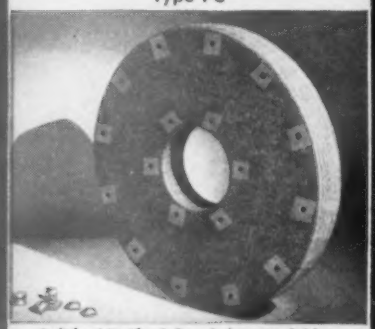
1. You get a faster, cooler cutting action on many foundry surfacing jobs with Norton Vitrified "P" or porous type discs, because the grain spacing in these discs is accurately controlled for extra chip clearance and the cutting action is uniform from periphery to hole. This makes them particularly well-suited for handling alloy steel and other heat-sensitive parts. Their scientifically controlled structure offers decided advantages over the old perforated discs sometimes used.
2. You get longer life on many surfacing jobs with these Norton discs because vitrified bond has the unique ability of holding the abrasive grain until its complete cutting life has been utilized, and then releasing the grain when it commences to dull. This eliminates the need for frequent dressing.
3. You eliminate aging and storing problems often encountered with magnesite bonded discs when you use Norton Vitrified Discs, for vitrified bond is stable and mature. These Norton discs are ready for use immediately upon delivery or may be stored until needed as the grinding properties will remain unchanged.
4. You save on initial expense, for vitrified bonded discs in sizes up to 30″ in diameter cost considerably less than resinoid discs.

Why not take advantage of these cost-cutting features offered by Norton Vitrified Discs? Your Norton abrasive engineer or distributor will be glad to study your disc grinding operations and to help you to select the most economical Norton Discs for each job.

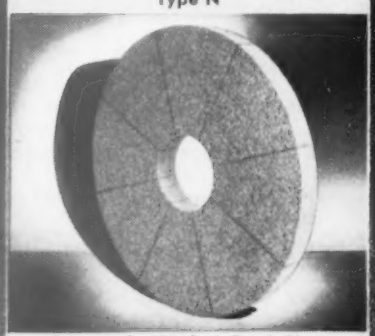
W—1255A



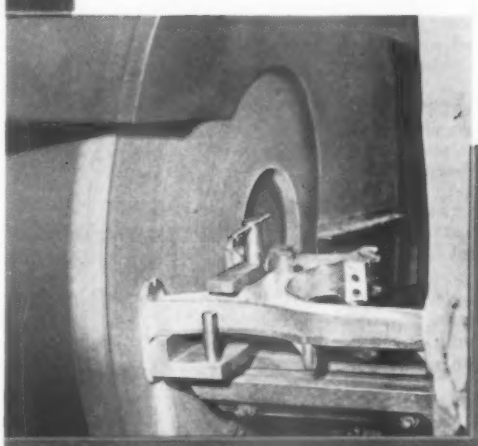
Solid—Vitrified Bond, Plate Mounted, Type PC



Solid—Vitrified Bond, Inserted Nut, Type N



Segmental—Vitrified Bond, Plate Mounted, Type PN



NORTON ABRASIVES

Segmental—Vitrified Bond, Inserted Nut, Type N

Segments—Resinoid Bond, Plate Mounted, Type PC

NORTON COMPANY, WORCESTER, MASS., New York, Chicago, Detroit, Cleveland, Philadelphia, Pittsburgh, Hartford, St. Louis, Los Angeles

NO STOPS... NO REPAIRS...

In more than two years!

"For the past two years our Gardner-Denver compressor has operated under approximately 100% load for 24 hours a day, seven days a week . . . overall performance has been exceptionally satisfactory."

Adam Moses, Vice-pres.
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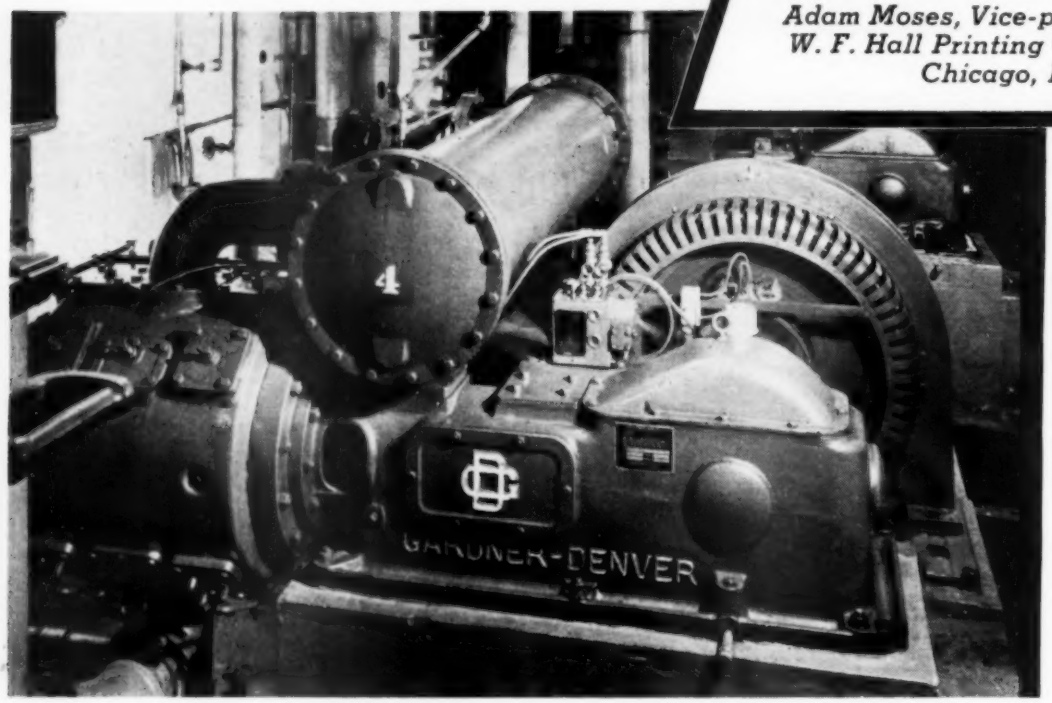

A Gardner-Denver HAB 13½ & 8 x 8 two-stage, horizontal compressor in the W. F. Hall Printing Co. plant, Chicago.

Continuous operation! Yet this Gardner-Denver Class "HA" Horizontal Compressor has required *no repairs other than minor adjustments* in more than two years. Accurate flow meter equipment indicates no variation in compressor output. Volumetric efficiency remains high . . . horsepower requirements low. Here are some "HA" features that explain this uninterrupted service record:

★ **AIR CYLINDERS** oiled by force-feed lubricator with separate and adjustable feed to each cylinder. Large and unrestricted valve and port areas result in low velocities and minimum friction losses.

★ **TIMKEN ROLLER MAIN BEARINGS** eliminate shaft friction and wear—provide permanent rigidity with freedom from bearing vibration, pounding and side thrust.

★ **LARGE WATER JACKET** areas for cooler running . . . lower discharge temperatures and lubricating economy.

★ **HEAVY-DUTY SIDE CRANK** type main frame of massive design—heavily ribbed and reinforced to give maximum strength and rigidity.

★ **DUO-PLATE CUSHIONED VALVES** for high delivery capacity.

For Complete information, write
Gardner-Denver Company, Quincy, Illinois
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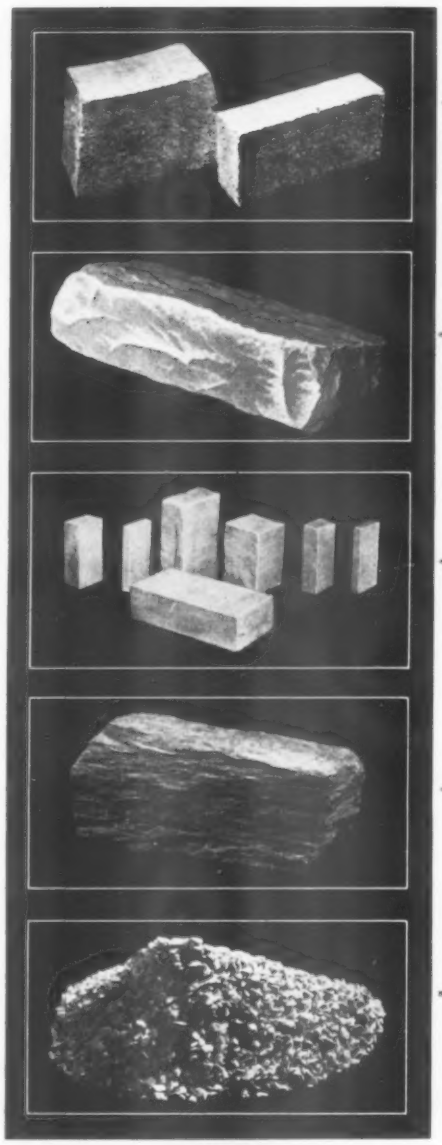
GARDNER-DENVER *Since 1859*

REFRACTORIES

for maximum operating economy!



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All Shapes and Sizes — Illinois-Indiana-Ohio

NEWCASTLE FIRE STONE

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MELTING ENGINEERING SERVICE ALWAYS AVAILABLE

Great Lakes Foundry Sand Co.

UNITED ARTISTS BLDG. — DETROIT 26, MICHIGAN

MINERS — PROCESSORS — FOUNDRY, METALLURGICAL AND SAND BLAST SERVICE

Presenting the New

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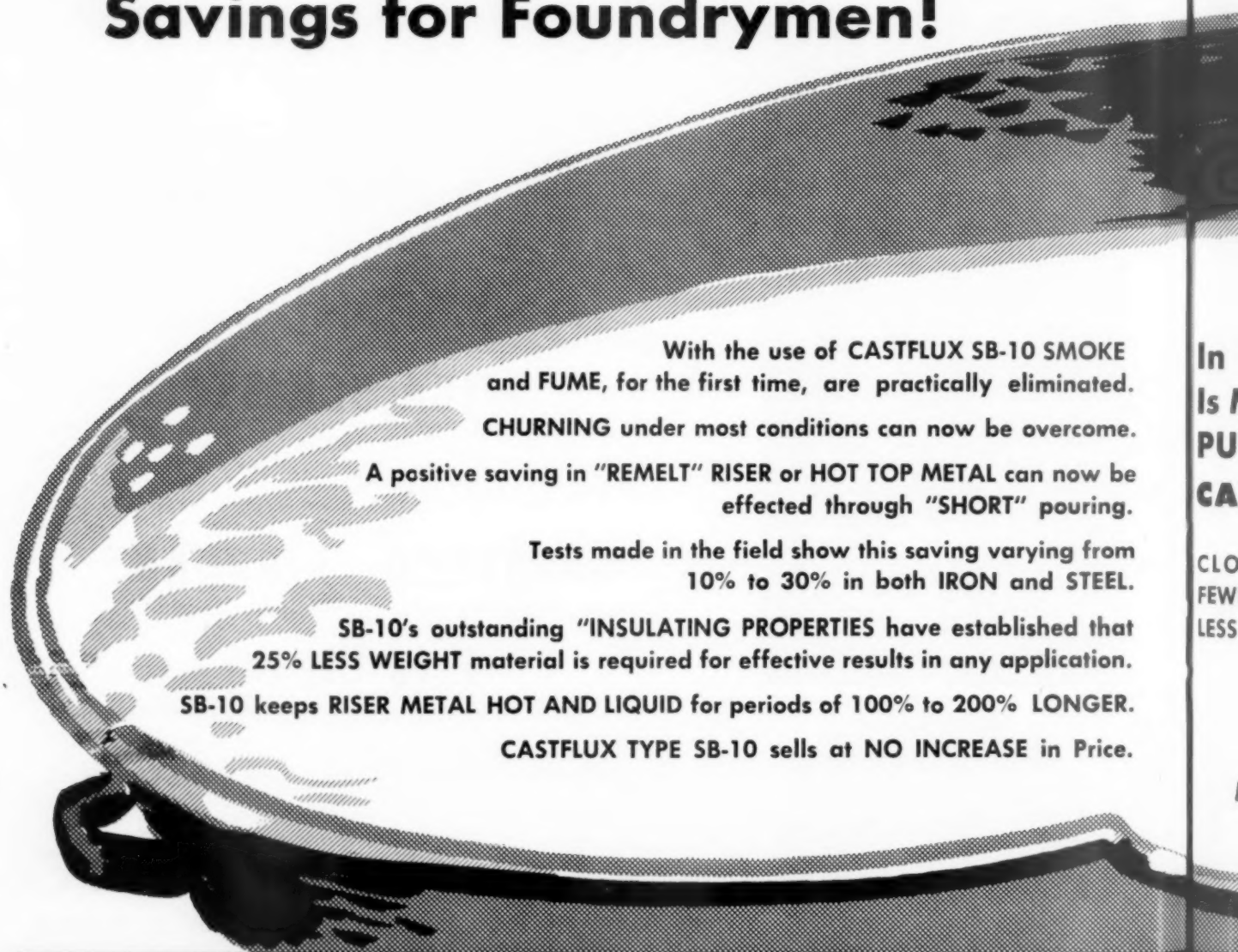
An Anti-Piping Compound So Revolutionary in Its Advanta and Accomplishments That Its Use Op a New Era of Quality Production Savings for Foundrymen!



With the use of CASTFLUX SB-10 SMOKE and FUME, for the first time, are practically eliminated.

CHURNING under most conditions can now be overcome.

A positive saving in "REMELT" RISER or HOT TOP METAL can now be effected through "SHORT" pouring.

Tests made in the field show this saving varying from 10% to 30% in both IRON and STEEL.

SB-10's outstanding "INSULATING PROPERTIES have established that 25% LESS WEIGHT material is required for effective results in any application.

SB-10 keeps RISER METAL HOT AND LIQUID for periods of 100% to 200% LONGER.

CASTFLUX TYPE SB-10 sells at NO INCREASE in Price.

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Type SB-10

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In The Ladle, FLUIDITY Is Materially Increased PURIFYING the Metal.

CASTFLUX TYPE SB-10
Also Gives You
CLOSER GRAINED CASTINGS, FEWER REJECTS, FEWER MISS RUNS, LESS REMELTING, LONGER LADLE LIFE, LESS LADLE CHIPPING

at a cost of
10¢ to 15¢
per ton of metal treated

It took 5 years of development and research to perfect SB-10.

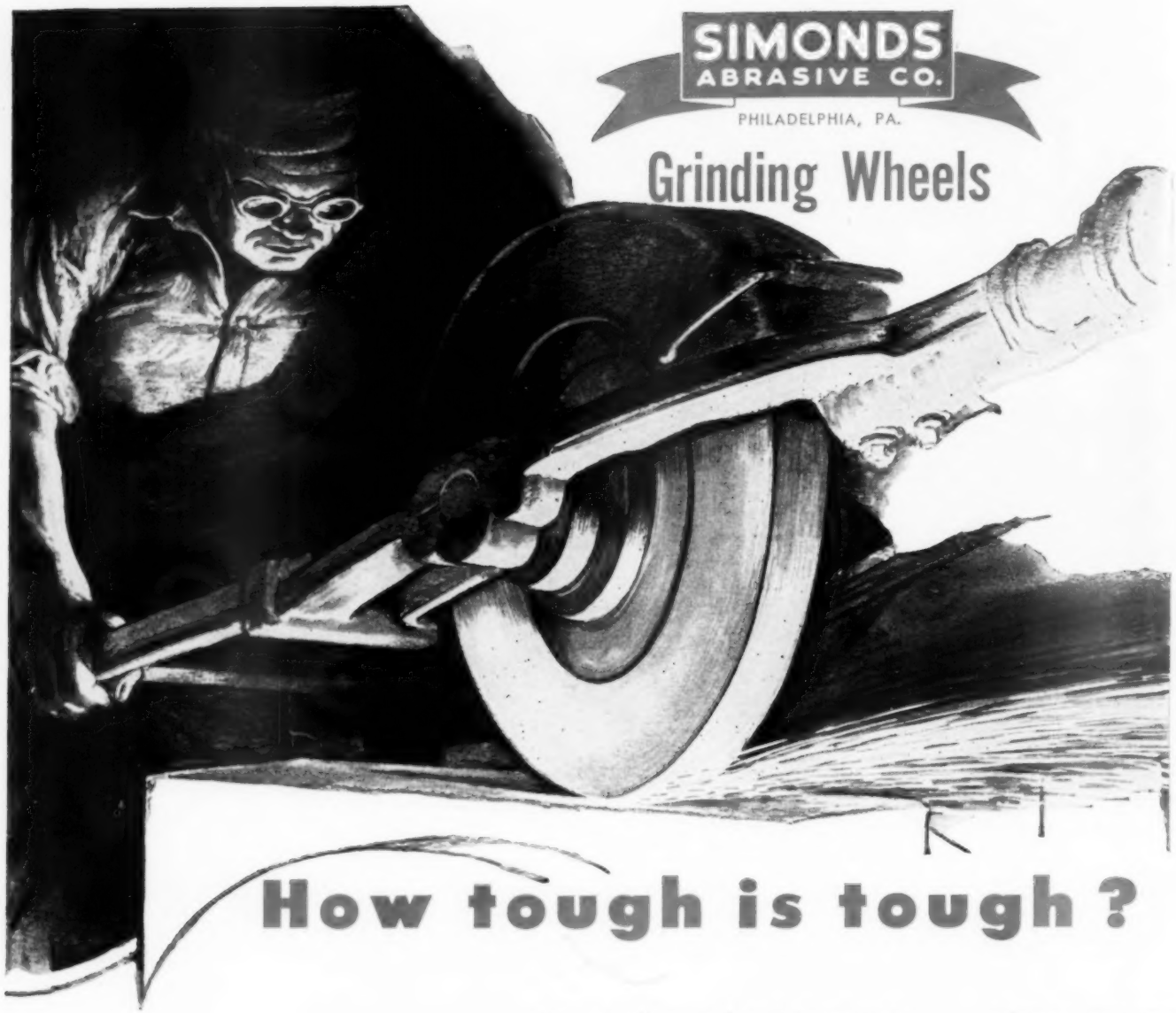
Foundrymen, in whose plants SB-10 has been tested for months consider it the most efficient anti-piping compound on the market. It is sold with this

Unconditional Guarantee

Unless Castflux Type SB-10 meets with your full approval material can be returned, provided we are notified within 30 days after receipt of material.

Write for Complete Details and Prices

COMPANY 2115-2117 EAST YORK STREET, PHILADELPHIA 25, PENNA.

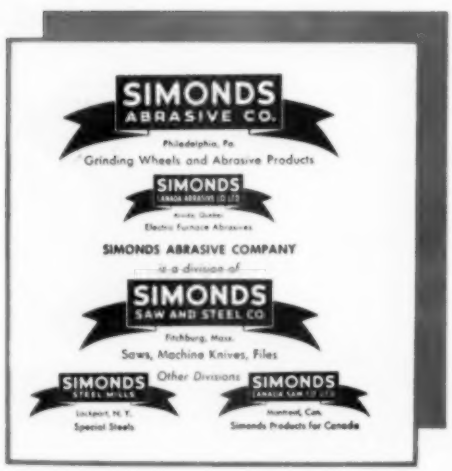


How tough is tough?

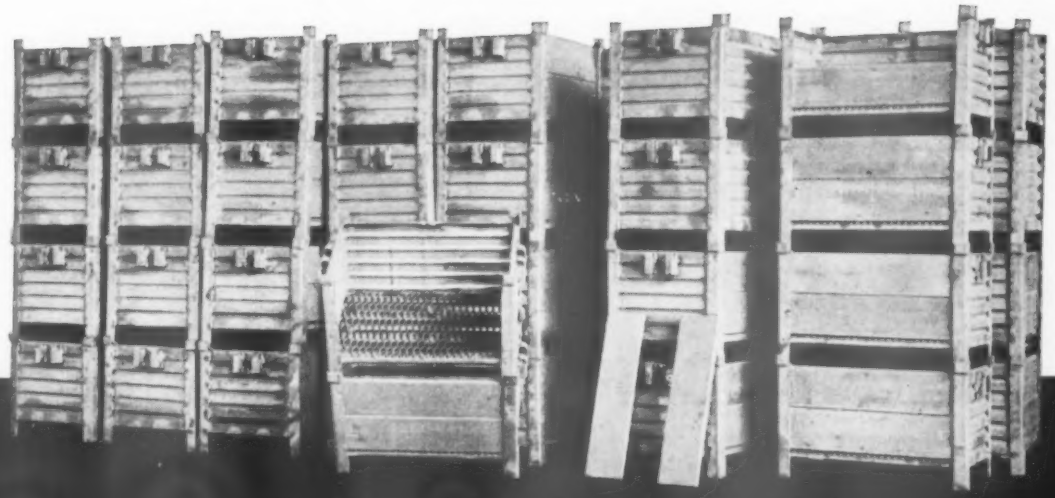
A grinding wheel is tough . . . plenty tough when it takes the severest operating use at 9,500 surface feet per minute . . . yet cuts fast and stands up to give you lowest wheel cost per pound of metal removed.

That's what you get from Simonds Abrasive Co. Snagging Wheels for cleaning castings and billets . . . as well as from other kinds of Simonds Abrasive Wheels used in the precision grinding field.

Send for your copy of our Grinding Wheel Data Book giving complete information including recommendation tables and address of nearest distributor equipped to serve you locally.



SIMONDS ABRASIVE COMPANY, PHILADELPHIA 37, PA. DISTRIBUTORS IN PRINCIPAL CITIES



Truscon Open-Side Steel Boxes

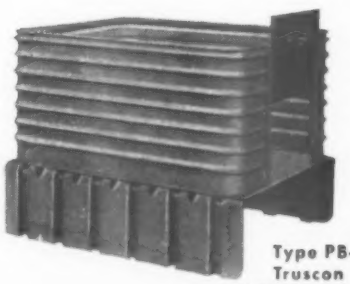
TRUSCON

Speeds FOUNDRY *Efficiency*

WITH STEEL EQUIPMENT FOR MOLDING, MOVING & STORING FOUNDRY MATERIALS

Truscon TM-10 Two Man Flask

Truscon CH-40 Crane Flask



Type PB-650 Truscon Box and Platform with sliding end door

TRUSCON OPEN-SIDE BOXES *(shown above)*
. . . speed efficiency through side-loading and tiering. Materials are easy to store, easy to get at, easy to inventory!

TRUSCON MATERIALS HANDLING EQUIPMENT
. . . speeds efficiency because pallets and platforms are designed to properly fit modern lifts, and are ruggedly built to stand the gaff of foundry use.

TRUSCON STEEL FOUNDRY FLASKS
. . . speed efficiency through ease of operation, ease of handling, and through long, trouble-free service.

Send for catalog, complete with specifications and details, on Truscon Materials Handling Equipment and Truscon Steel Flasks.

TRUSCON STEEL COMPANY
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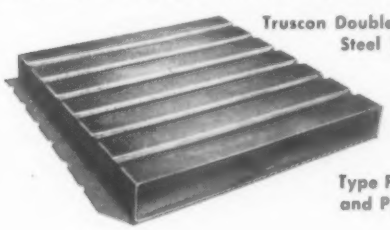
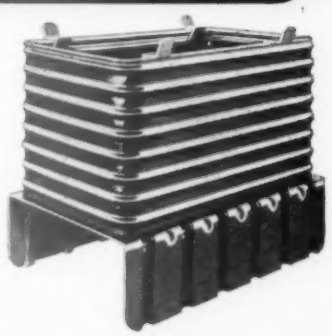
6100 Truscon Avenue • Cleveland 4, Ohio
Subsidiary of Republic Steel Corporation



Truscon Double Face Steel Pallet



Type PB-120 Truscon Steel Box and Platform

Truscon OM-1 One Man Flask

Type PB-120T Truscon Steel Box and Platform with Tiering Lugs

You'll Get the Finest Castings FASTER—AT LOWER COST with ADAMS MOLDING MACHINES

10" POST TYPE JOLT SQUEEZER—PORTABLE TYPE

Here's the fast, accurate molding machine that meets today's demand for high speed production of "exactly-true-to-pattern" castings . . . and reduces operating costs! Extremely flexible, Adams Molding Machines stand up under tough production schedules . . . substantially increase production of *better* molds in *less* time. Steady, high output levels are maintained even with unskilled labor.

Speed, stamina, power and simplified design make efficient operation easy. Convenient accessible controls for quick handling . . . minimum working parts, protected against sand and dust, for reduced maintenance costs . . . close control of jolting and squeezing operations for accurate, uniform molds. There's dependable, long-term service throughout prolonged hard usage in Adams Molding Machines. Write today for full details in Catalog 705. THE ADAMS COMPANY, 700 Foster Street, Dubuque, Iowa.

SIZES AND TYPES FOR ANY SQUEEZE MOLDING REQUIREMENTS

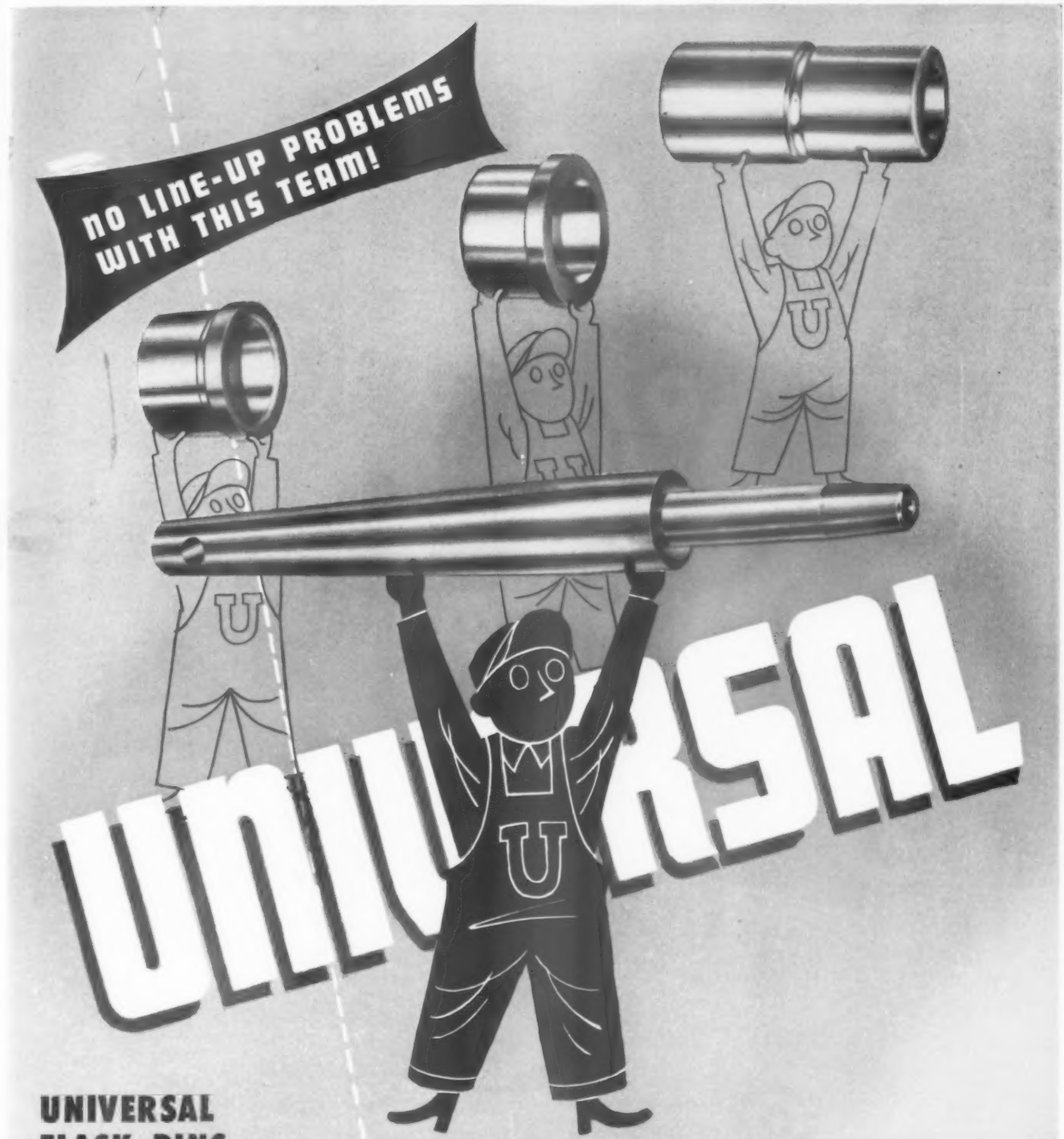
Side Rod Type and Post Type — Jolt Squeeze and Jolt-Squeeze-Pattern-Draw Styles — Stationary and Portable Hand Squeezers

The ADAMS Company

ESTABLISHED 1883

MOLDING MACHINES and FLASK EQUIPMENT

DUBUQUE, IOWA, U.S.A.



UNIVERSAL FLASK PINS, BUSHINGS, and CLOSING PINS for perfect alignment of cope and drag

Here is a team that has helped eliminate cope and drag problems in many foundries — Universal Flask Pins, Bushings and Closing Pins. Cope Bushings are quickly guided to the Drag Pins over tapered, loose-fitting Closing Pins which are quickly removed after assembly. Special design of Elongated Flask Bushing permits longitudinal expansion to compensate for metal heat, without affecting accurate alignment. Round, elongated, press fit and taper types for cast iron, steel, aluminum and magnesium flasks are available for immediate delivery in several sizes. Special types and sizes to order. Write for complete information.

UNIVERSAL ENGINEERING COMPANY

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Every International graphite electrode and nipple is manufactured according to rigid specification standards . . . from mixing raw materials to boring and threading the finished product, tested and checked again and again to maintain constant high quality. It is this careful control that assures trouble-free performance so characteristic of International electrodes.

Specify "International" to be sure of getting the best graphite electrode money can buy.

Graphite Products for Electrothermic and Electrolytic Applications.

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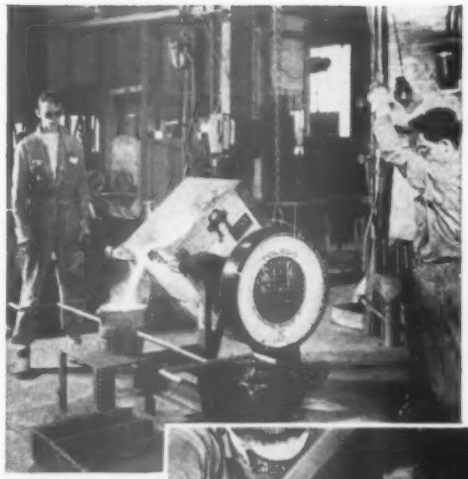
FOR *Precision Casting*



Melting alloy iron for centrifugal casting at Koppers Company, Piston Ring Division

Pouring super-alloy from 300 lb. Ajax-Northrup furnace at Mercast Corporation

Precision investment castings being made by Arwood Precision Casting Corporation

USE AJAX-NORTHRUP MELTING

For all precision casting—centrifugal casting, lost-wax processes, the Mercast process, etc. — one furnace alone is outstanding for perfect control over production melts of tough-to-handle alloys—with low maintenance year after year. That is the Ajax-Northrup high frequency furnace. Thousands of these furnaces have successfully handled all types of alloys over a period of 33 years.

FAST—it melts 5 lbs. of steel in 13 min. with self-tuning 20 kw. Ajax-Northrup converter, or 100 lbs. in 20 min. with 100 kw. motor-generator. So fast there's no chance for oxidation.

CLOSE ANALYSES — LOW CARBON — good for stainless steels where carbon should be held below 0.08%. Carbon can be controlled within 0.01 or 0.02%; other alloying elements within 0.25%. It's the most economical way to melt metals high in chromium, nickel, tungsten, cobalt, selenium, etc.

ECONOMICAL — generally more efficient than other electric furnaces of same size. "Pays for itself by saving alloying constituents and deoxidizers," says one user. And on alloy cast iron, Ajax-Northrup melting plus centrifugal casting doubled the yield of finished castings per ton melted.

CAPACITIES—from 8 oz. to 50 lbs. with trouble-free spark gap converters, and from 10 lbs. to several tons with motor-generator operated units. Linings and crucibles to suit all alloys. Easily interchangeable for handling different alloys. Write for more facts.

118

SINCE 1916

AJAX NORTHRUP
HEATING & MELTING

AJAX ELECTROTHERMIC CORPORATION
AJAX PARK, TRENTON 5, N. J.
Associate Companies
THE AJAX METAL COMPANY • AJAX ELECTRIC FURNACE CORPORATION
AJAX ELECTRIC COMPANY, INC. • AJAX ENGINEERING CORPORATION

Improving Machinability of GRAY IRON CASTINGS

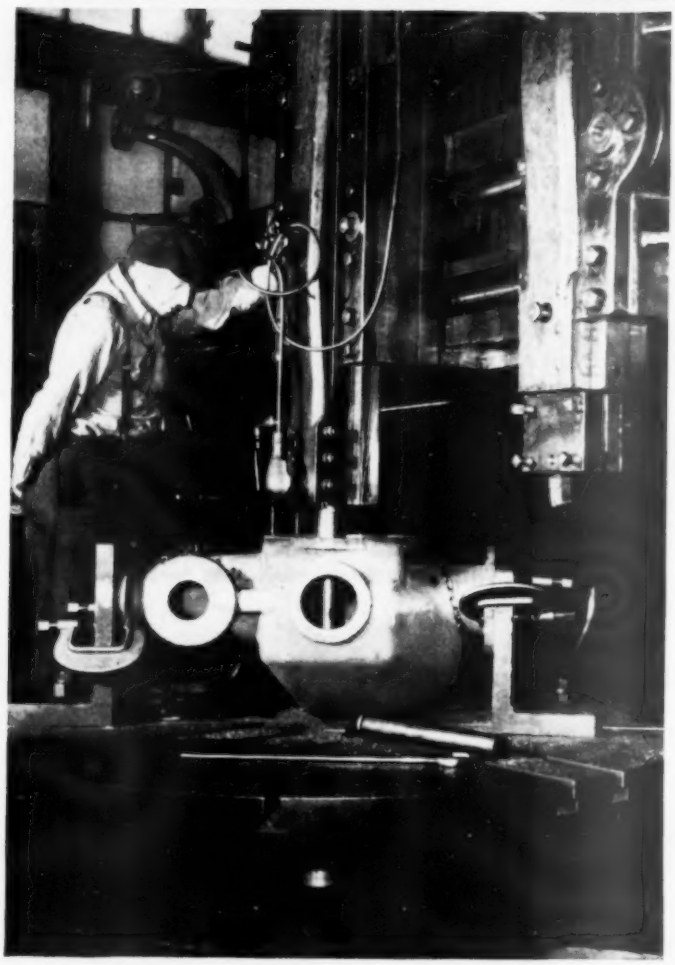
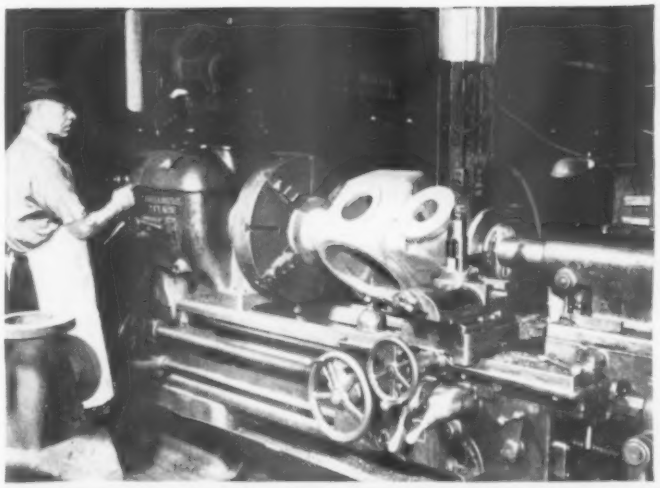
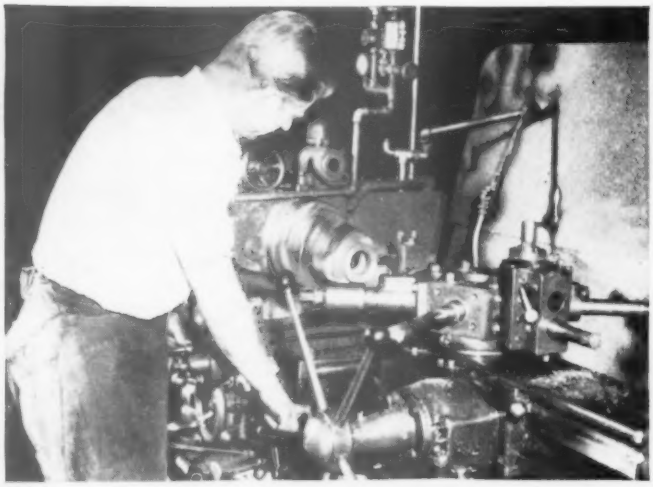


Photo Credit: Photos showing machining of castings, which have been treated with FERROCARBO Briquettes, are by the courtesy of the Rockwell Manufacturing Company, Pittsburgh, Pa. Castings were produced at Monnessen Foundry, a division of Rockwell.





3 IMPORTANT ADVANTAGES

are reported in machining castings which have been treated with FERROCARBO silicon carbide Briquettes.

1. Reduced machining time
2. Lower tool costs
3. Fewer rejected castings

The net result is realized in lower machining costs and increased profits. Complete detailed information on FERROCARBO Briquettes is easily obtainable from our metallurgical staff.

FERROCARBO Briquettes

BY CARBORUNDUM

TRADE MARK

THE CARBORUNDUM COMPANY, Bonded Products and Abrasive Grain Division, Niagara Falls, New York

FERROCARBO Distributors: Kerchner, Marshall & Co., Pittsburgh, Cleveland, Birmingham, Philadelphia and Buffalo; Miller and Company, Chicago, St. Louis and Cincinnati

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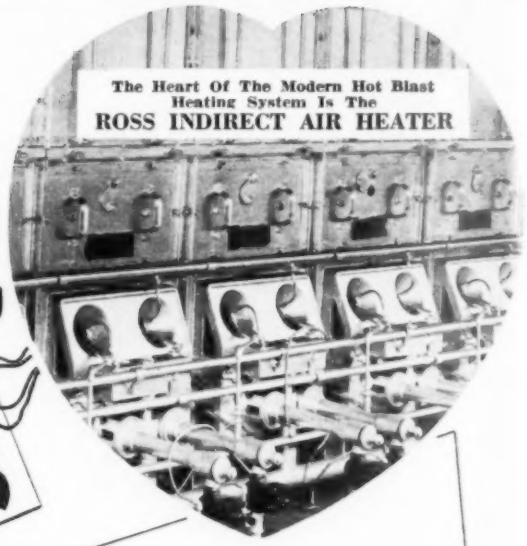
IF YOU PLAN TO PROFIT WITH MODERN

Hot Blast Cupola Heating



RECENT Installations Ordered From ROSS

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In every field of engineering there is one organization best equipped with practical knowledge and experience to maintain leadership in that field.

For designing and installing cupola heating systems, ROSS ENGINEERING is the recognized leader. Such leadership is understandable for the following reasons:

- Cupola heating is an air heating problem, a field in which Ross Engineering has specialized for nearly 30 years.
- Ross engineering heating systems have long been recognized throughout industry as the most efficient in design and operation.
- Ross Engineering builds the famous Ross Air Heaters that constitute the heart of all successful cupola heating systems.
- Ross Engineering is best equipped to install a complete job with proper number of heating sections for air volume needed, all duct work, platforms, etc.

If you are interested in a properly designed and installed cupola heating system to substantially reduce your operating costs, the logical source for specific information and recommendations is a Ross engineer. Utilize experience to get best results. J. O. ROSS ENGINEERING CORPORATION, 350 Madison Ave., New York 17, N. Y. Offices in Boston, Detroit, Chicago, Los Angeles, and Montreal, Canada.

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ROTOR NUT SETTERS PAY FOR THEMSELVES IN *10* DAYS

Job: Assembly of sink tops. Were using hand ratchet type screw drivers to set ¼" square nuts —20 to a sink top.

Problem: To cut costs and improve product. To control tightness of nut-setting and avoid ripples in linoleum when back board and trim were pulled in place. Tools were tough on workers' hands.

Called in the Rotor Application Engineer.

Results: Changed over to Rotor Midget Nut Setters.

Output increased from 4 tops per hour to 16 tops per hour. 75% savings in assembly costs paid for the $90 tools in 80 working hours.

Extraordinary? Not at all . . . and we'd be glad to tackle *your* portable tool problems—grinding, screw driving, sand ramming, buffing, or what have you!

Yours for lower costs,

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This AO Safety Legging IS "AIR CONDITIONED" for Comfort!

Ideal for ladlemen, furnace men and other foundry workers, this spring-type legging "wraps around" but doesn't bind the leg. The spring fits close to the leg but the material does not hug because of the ventilation area between leg and material. The legging is easily put on and removed and no adjustment is necessary. It fits securely at the ankle and below the knee — a spring steel clip holds the flare tight on the instep. There is no better protection against heat, sparks and hot metal splashes for leg, ankle and instep. Available as the No. 1512 in chrome-tanned cowhide leather, in asbestos as the No. 1481, in flame-resisting duck as the No. 1482.

Your nearest AO Safety Products Representative can supply you.

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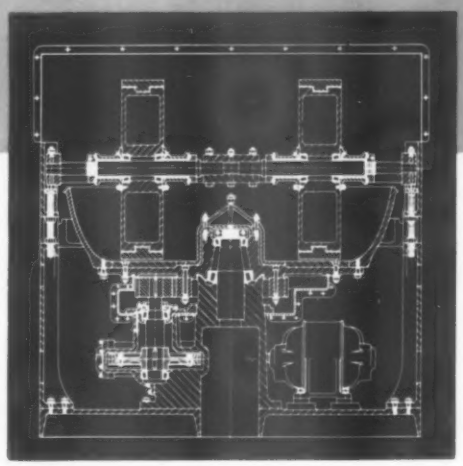
HOW TIMKEN® BEARINGS HELP TO KEEP FOUNDRY SAND IN TOP NOTCH CONDITION



Sectional drawing through Clearfield sand mixer showing the points of application of Timken bearings.

In sand mixers of the muller type, like this Clearfield No. 610, efficient performance depends largely on smooth, coordinated operation of the muller wheels and pan.

That's why Clearfield Machine Company, Clearfield, Pennsylvania, mounts these important parts on Timken tapered roller bearings. To further add to operating smoothness, dependability and economy, Timken roller bearings also are used in the pan driving mechanism.

Timken bearings assure long dependable machine life because they carry all loads — radial, thrust and both together in any combination; are made of Timken fine alloy steel, heat-treated and case-hardened; are scientifically designed and precision-manufactured; are produced by the world's largest manufacturer of tapered roller bearings. Make sure you have them in the machines you buy.

Look for the trade-mark "TIMKEN" on every bearing you use.

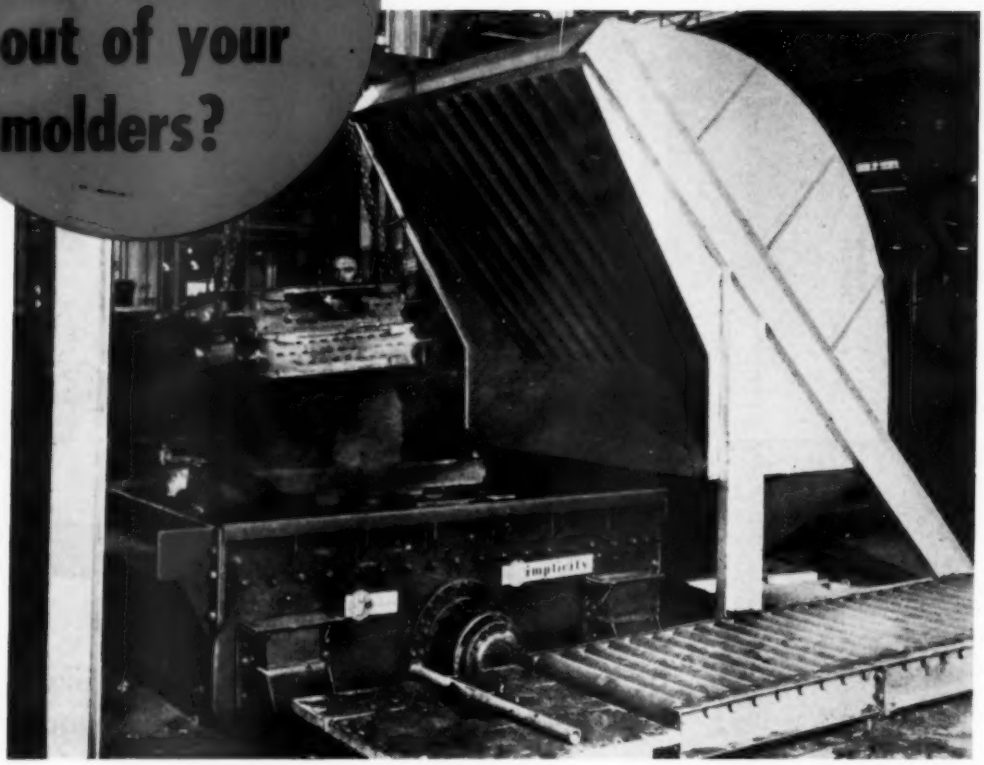
THE TIMKEN ROLLER BEARING COMPANY
CANTON 6, OHIO · CABLE ADDRESS "TIMROSCO"

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

NOT JUST A BALL ◯ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ◯ AND THRUST —◯— LOADS OR ANY COMBINATION —◯—

Are you making idlers out of your molders?

Let this husky, heavy duty 4'x6' SIMPLICITY SHAKEOUT set the pace in your foundry production.



Ever see the molders in your plant idle—waiting for the shake-out to catch up? That waste can be eliminated—quickly—with Simplicity Shakeouts such as this Heavy Duty 48 x 68 shown above. Its rugged strength and years-ahead design will perform your toughest shake-out job. . . .at highest speed!

There's plenty of real out-on-the-job foundry room proof of this high production. Several Simplicity Shake-outs, now in operation, handle as many as 650 flasks per hour. . .with speed to spare. And, if you want both flask shakeout and core knockout with one machine, in one operation. . .Simplicity has been doing that, too, for years!

More than 800 foundries have picked Simplicity Shake-outs during the past 15 years. They know worker's conditions are improved, production is speeded, healthier profits are made when Simplicity Shake-outs roll up their sleeves and go to work. The complete Simplicity Foundry Equipment catalog is a helpful booklet for any foundryman. Your copy is waiting for you. . .just write, right now.

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ROTO-CLONE makes a dust storm disappear for keeps

Swing frame grinder dust can now be controlled effectively — economically

THIS close-up photo of a swing frame grinder in operation tells the story of Roto-Clone* dust control better than words. Here's one of the worst offenders when it comes to producing dust, yet the surrounding atmosphere is clear and clean. It's the Type D Roto-Clone that does this job so effectively—and its advantages are many:

1. Constant Efficiency in dust separation under all operating conditions.

2. Uniform Air Volume, assuring proper suction at hoods and unvarying air velocities in pipe lines.

3. Small Space Requirement—functions of exhauster and separator combined in compact, self-contained unit.

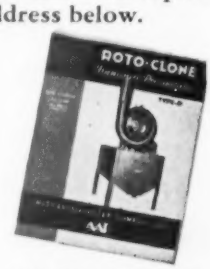
4. Low Cost of System—Roto-Clone may be located at or near dust source, eliminating long pipes and the expense of outdoor installations.

5. Ease of Installation—requires only electrical and piping connections—no complicated parts assembly. May be readily moved to new location if desired.

That's why more grinders are exhausted by Type D Roto-Clone than any other type dust collector. And you have the choice of installing this system as a central type with main duct and branch connections or as an individual unit serving a single dust-producing operation. For complete information, call your local AAF representative or write direct to address below.

Find Out How It Works To Save You Money!

Write for Bulletin No. 272A describing the Type D Roto-Clone and its wide variety of applications.



AMERICAN AIR FILTER COMPANY, INC.
266 Central Avenue, Louisville 8, Ky.
In Canada: Darling Bros., Ltd., Montreal, P. Q.

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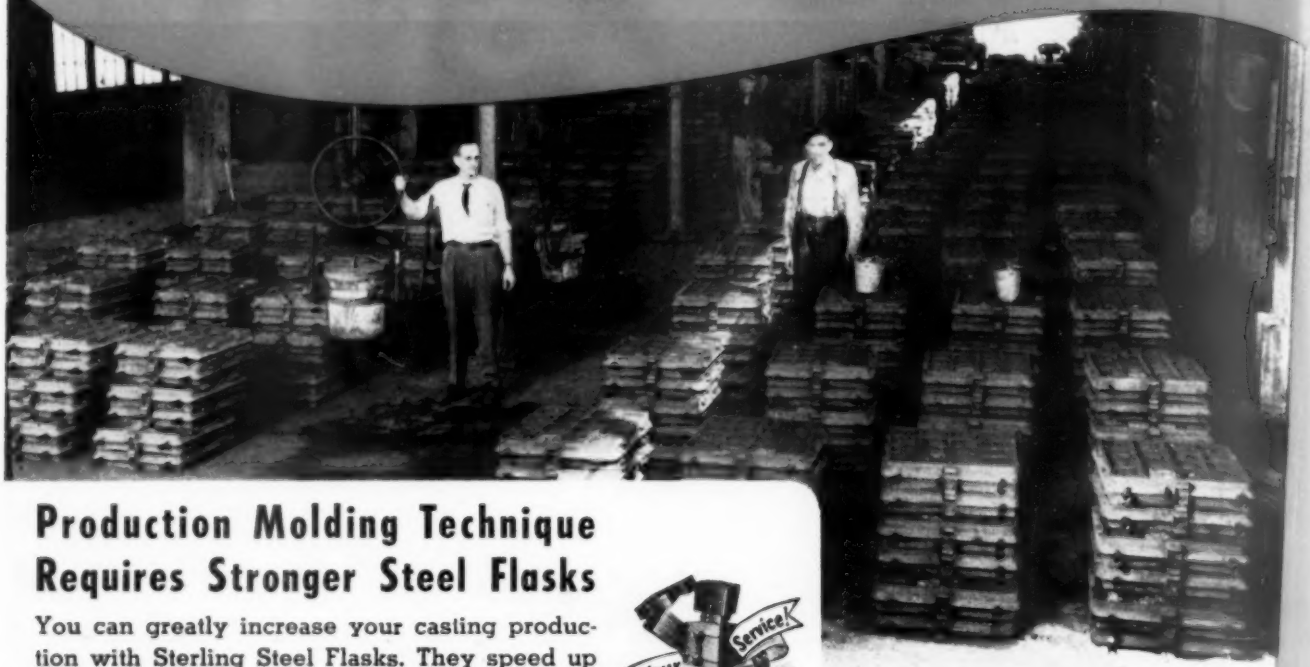
MEMBER AIR FILTER EQUIPMENT

ROTO-CLONE®
DUST CONTROL EQUIPMENT

**Roto-Clone is the trade-mark (Reg. U. S. Pat. Off.) of the American Air Filter Company, Inc., for various dust collectors of the dynamic precipitator and hydro-static precipitator types.*

20,000 CASTINGS PER DAY with Sterling Steel Flasks!

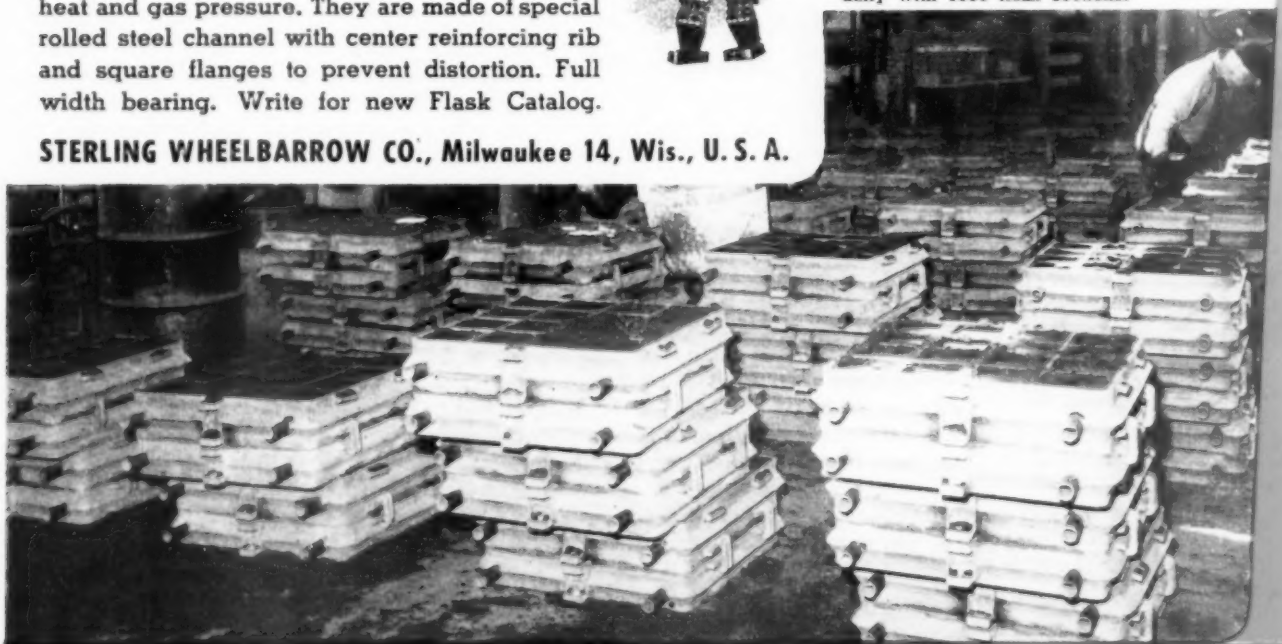


Scene at Long Foundry Co., Hoquiam, Washington where 20,000 castings can be produced daily with 1000 flask sections.

Production Molding Technique Requires Stronger Steel Flasks

You can greatly increase your casting production with Sterling Steel Flasks. They speed up the molding job, reduce unit costs to rock bottom. Sterlings are built to withstand tremendous heat and gas pressure. They are made of special rolled steel channel with center reinforcing rib and square flanges to prevent distortion. Full width bearing. Write for new Flask Catalog.

STERLING WHEELBARROW CO., Milwaukee 14, Wis., U. S. A.



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Munitions Board Committees Tribute to NCC Efforts

ANNOUNCEMENT by the Munitions Board of the appointment of a Technical Subcommittee of the Foundry Industry Advisory Committee represents the final step in a program which has brought recognition to the foundry industry and a realization on the part of the military agencies of the basic character of castings in any national emergency. From an outcast orphan in the storm, the industry now has progressed to the point where it is an accepted member of the family of essential industries.

Through co-operative efforts on the part of leaders in the foundry industry and the Munitions Board, an extensive committee setup has been organized which should go far in permitting foundries to render maximum service to the nation whenever needed. A Foundry Industry Advisory Committee, made up of 21 men representing all branches of the industry, has been organized by the Munitions Board to advise in the development of those features of the industrial mobilization plan which are related to ferrous and nonferrous foundries, and to producers of foundry equipment and supplies. Ten subcommittees have been organized under this general committee to handle detailed problems in connection with aluminum and magnesium castings, brass and bronze castings, cast armor plate, cast iron pipe, gray iron castings, malleable iron castings, steel castings, foundry equipment, foundry supplies, and technical phases of castings.

Organization of the Foundry Industry Advisory Committee and the ten subcommittees represents a notable accomplishment of the National Castings Council and a tribute to broadmindedness of its eight member societies. Because foundry trade, technical and management organizations were willing to band together in the interest of the common good, the National Castings Council was able to present certain recommendations to the Munitions Board in the name of the entire foundry industry. And because officers of the Munitions Board, including Lt. Col. Frank H. Holmes, who has been Board liaison to the committees, were receptive and willing to devote time and effort to the problem, the foundry now is one of the leading industries in planning for the emergencies we all hope will never come.

In the Munitions Board committee organization, foundrymen have a striking illustration of the good that may be accomplished by co-operative efforts through the National Castings Council. Other services not so apparent may be recorded as accomplishments. Therefore, it seems that those who are asking too much in the way of tangible results for the Council, and those who are deprecating its accomplishments are rendering a disservice to the foundry industry. Given time, and a willing hand, the National Castings Council will continue to help in the building of a better foundry industry.

Frank G. Steinebach
Editor

THE FOUNDRY
WHEREVER METALS ARE CAST

New Memphis Foundry Sets Standard in

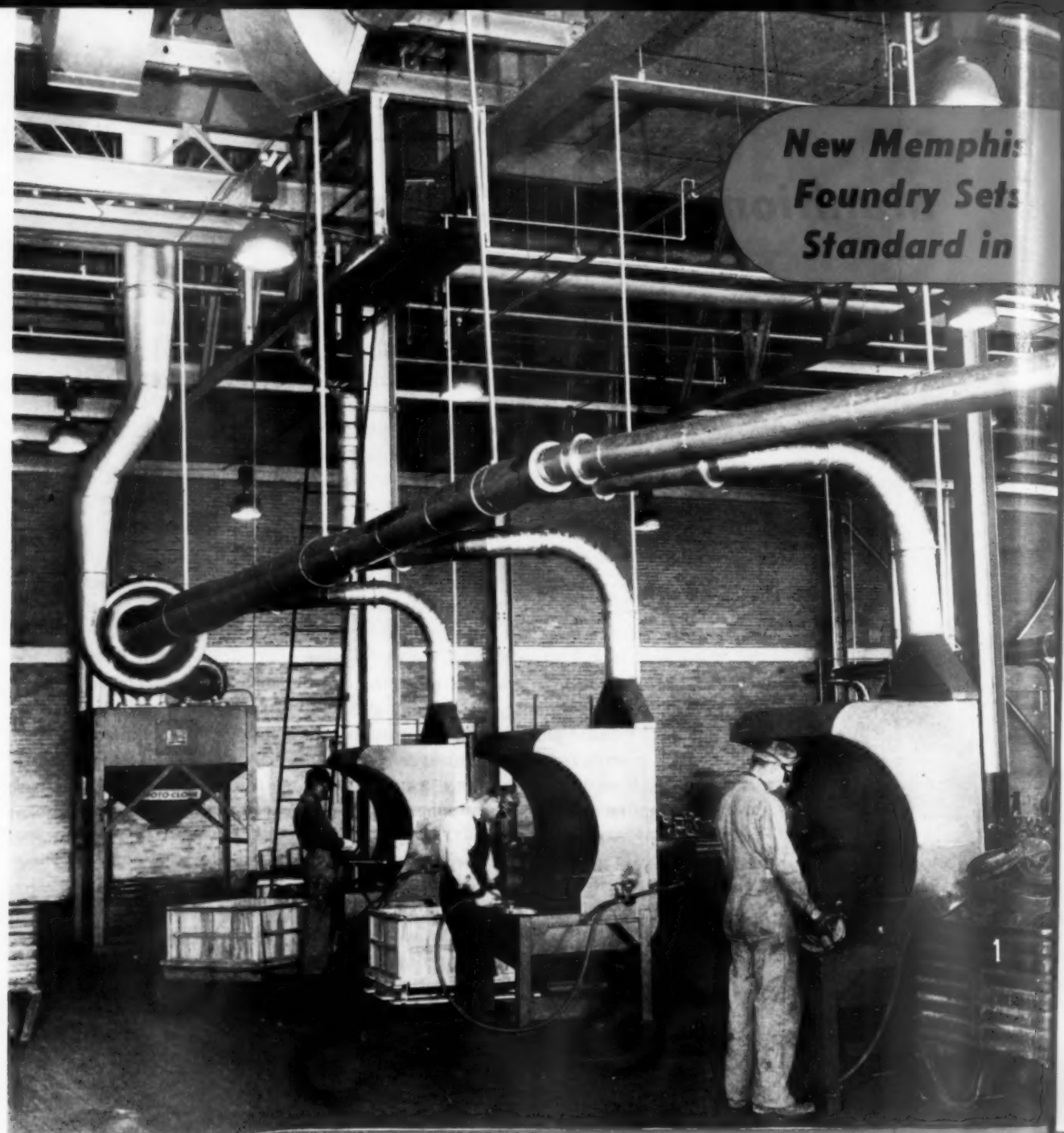


Fig. 1—Effective dust control promotes good housekeeping at International Harvester Co.'s new Memphis foundry

Fig. 2—Raw materials yard. Crane runway extends into sand storage building in background

Fig. 3—Core sand ingredients are accurately weighed before being dumped into mixer

Fig. 4—Rack conveyor alongside core blowers and benches carries green cores to baking oven

Good Working Conditions

TRENDS in the design of new foundries in recent years have been influenced by the attempt to attain two major objectives—the most economical production of the highest quality castings, and desirable working conditions. On both scores the new gray iron foundry of the International Harvester Co., at Memphis, Tenn., easily ranks among the most advanced design.

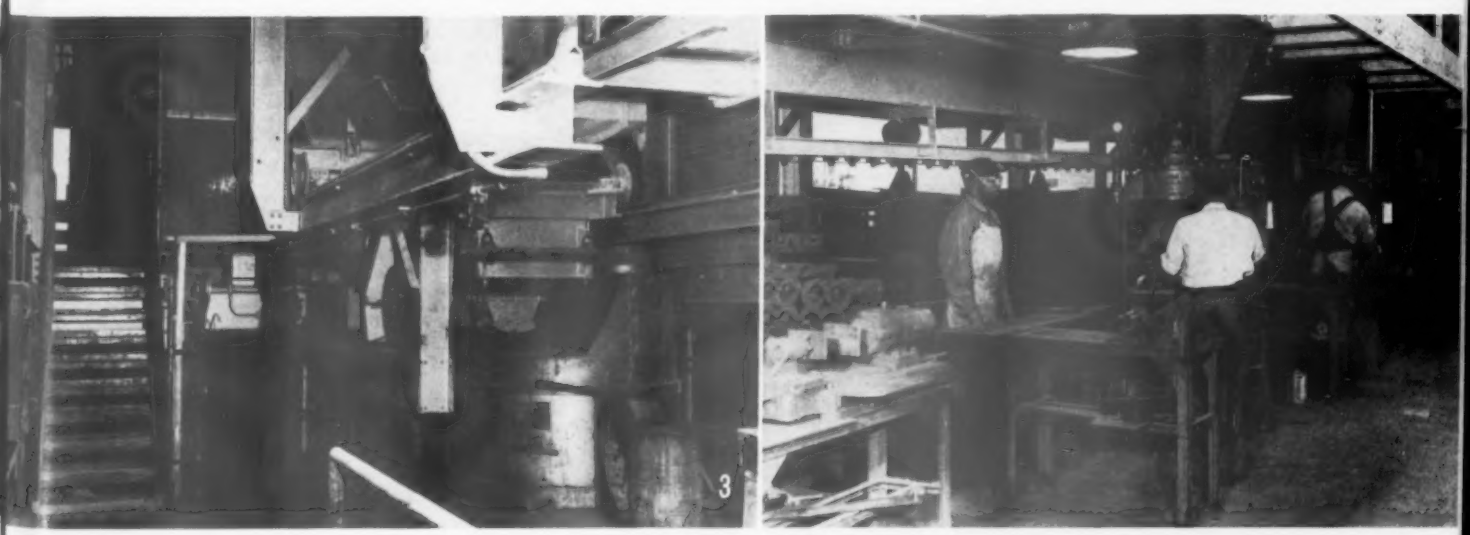
This foundry is an important part of Harvester's new Memphis Works, a $20-million project which was formally opened in April, 1948. The works comprises 12 buildings occupying almost 30 acres of a 262-acre site fronting on the Mississippi River but located on high ground safe from the threat of floods. Prior to the start of plant construction in the spring of 1946, the land was devoted to farming; today a variety of tools required by agriculture are flowing from the site. The plant's more than 2200 employees—approximately 500 of whom are foundry workers—produce more than 40 different types of farm implements, chief of which are a light pickup hay baler and a mechanical cotton picker.

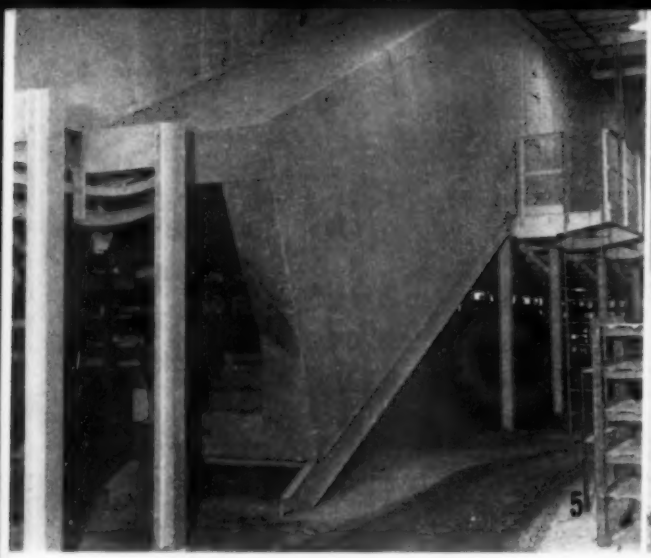
By WILLIAM G. GUDE
Managing Editor
THE FOUNDRY

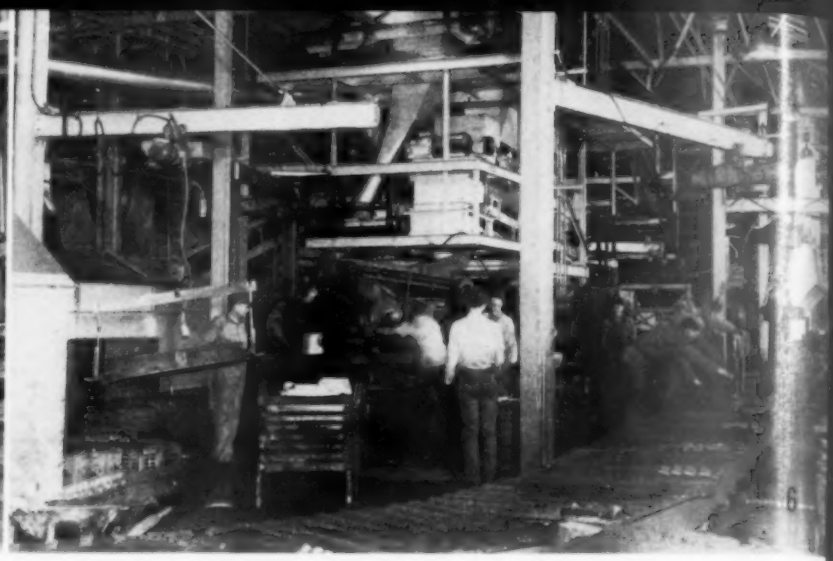
Company engineers were able to take advantage of the opportunity to design the works as a unit so as to provide the most efficient flow of materials from the foundry, forge shop and steel storage through the manufacturing and assembly departments—and at the same time to equip the plant with the most modern tools and equipment. The charge has been made that the foundry department of integrated manufacturing plants frequently is relegated to a "step-child" status compared with other departments in the matter of equipment and working conditions. This condition does not exist at the Memphis Works. It might be pointed out that Harvester's industrial engineering and construction department, which supervises the design and building of new plants, is also concerned with the layout of foundry facilities and the direction of all engineering pertaining to safety equipment and to the other factors affecting the health of workers. This co-ordination provides an integrated program in the attainment of the most satisfactory working conditions.

Several factors combine to make this foundry a comfortable place in which to work. For instance, the roof includes 1 inch of fiber board insulation, topped by 2 inches of poured gypsum and a built-up gravel roof. The insulation board not only retains the heat in the winter and reduces the effect of the sun's rays in the summer, but it has an acoustical value in absorbing sound, thereby reducing noise levels. Additional acoustical treatment is provided by use of 1-inch insulating board above the sidewall window line, extending to the underside of the ceilings. Also assisting to reduce noise are the use of a wood block floor for a large portion of the building, and enclosure of the cupolas and charging facilities.

As an aid in controlling dust, large grass plots instead of cinder-topped yards have been located around individual buildings wherever possible. In







addition, trees and shrubs have been planted so as to help in reducing the amount of wind-borne dust and to have a cooling effect on the buildings.

The foundry buildings are of conventional A-frame truss design, and the roofs are topped with continuous ridge ventilators. These ventilators work on the gravity principle. The plant also is equipped with fresh air supply units which put the buildings under positive pressure when the windows and doors are closed. To do this it is necessary to introduce a greater volume of fresh air than that which escapes through natural building leakage and through the exhaust systems operating on dust and fume control. No process exhaust air is permitted to return to the foundry interior after cleaning.

In the molding and pouring area of the main foundry building fresh air is supplied at the rate of 453,600 cfm and process air is exhausted at 374,720 cfm, this section being provided more than 13 changes of air per hour. The casting cleaning department has a fresh air supply of 151,200 cfm, exhaust of 119,500 cfm and 10 changes per hour. The coreroom receives 86,400 cfm of fresh air, exhausts 50,776 cfm and has 8½ changes per hour. In cold weather the fresh air is heated before being introduced into the plant.

How effective a job has been done in foundry ventilation and in removal of dust and fumes is immediately apparent to the visitor. Not only is there an absence of haze or smog when viewing the more than 550-foot length of the molding, pouring and cleaning department floors, but the circulation of air enables the building to offer welcome relief on hot summer days.

Special attention also has been given to illumination. Artificial lighting supplements the considerable amount of natural light supplied through windows, which comprise a major portion of most of the building walls. The lighting facilities are designed to provide 20.3 foot candles of illumination at working levels.

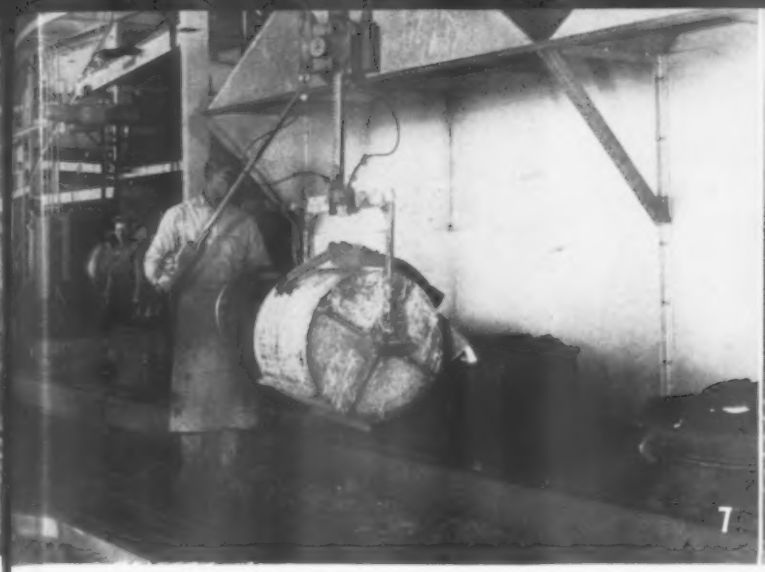
Three attractive wash, locker and toilet rooms are

Good Working Conditions

Fig. 10—Intermediate molding unit. Tight as well as snap flask work is conducted on this line

Fig. 11—Transferring hot metal to pouring ladle at one of the squeezer lines. All metal is transferred from the cupolas to pouring lines by this type lift truck

Fig. 12—Two of the six 7-man squeezer units. Each has its individual mold conveyor



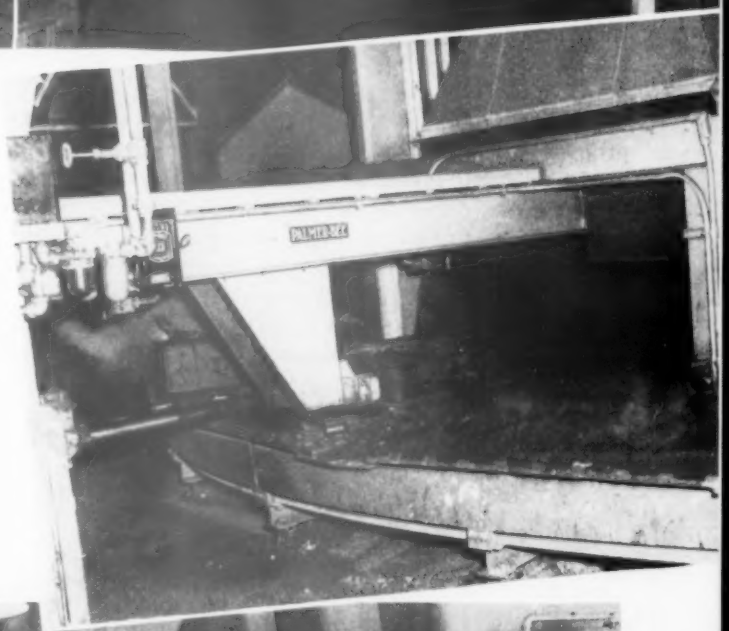


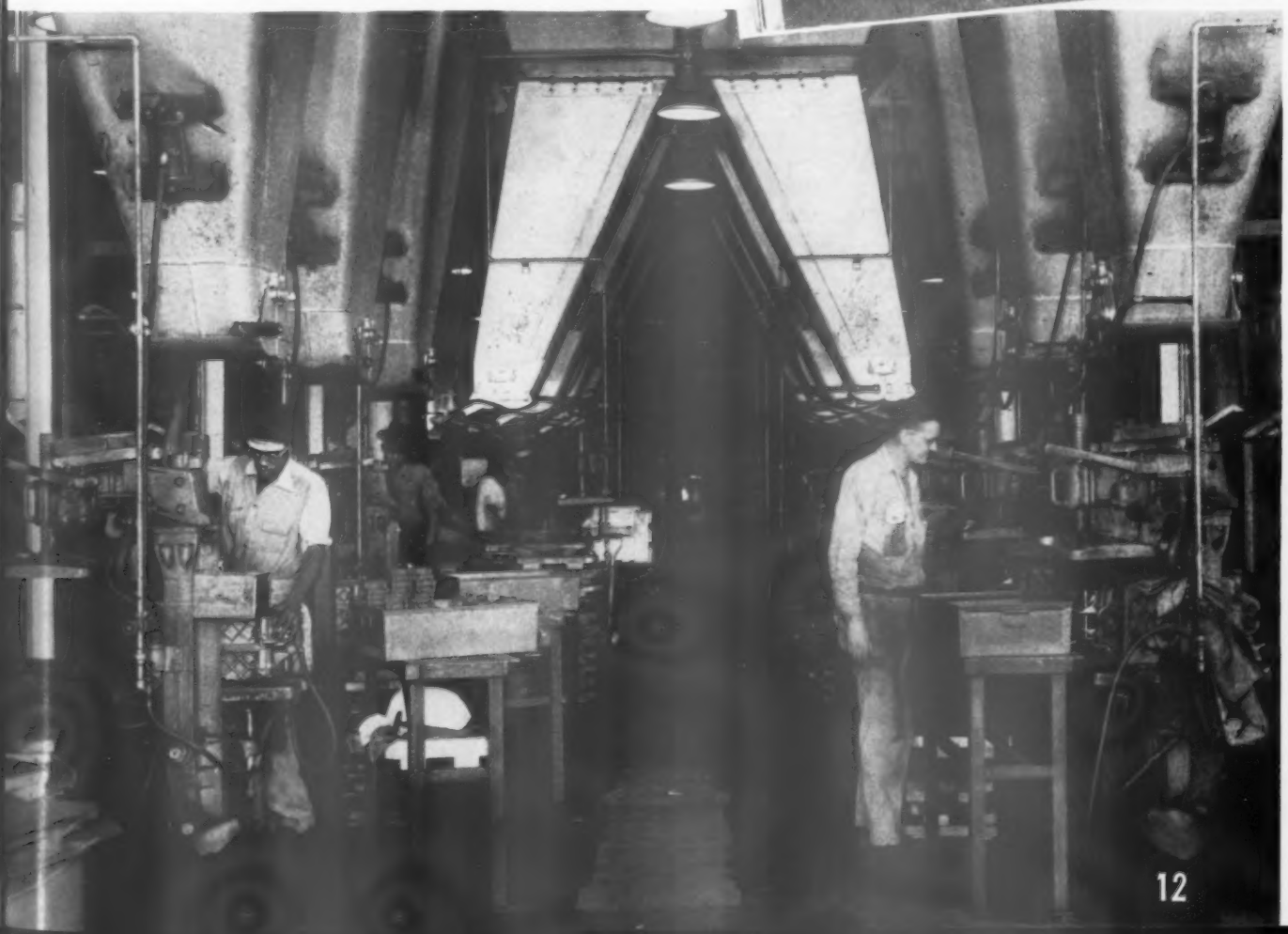
Fig. 5—Entry of conveyor into horizontal type, continuous core baking oven

Fig. 6—Molds for largest castings are made by this unit which is equipped with two stationary sandslingers

Fig. 7—Pouring station of the slinger line. Ladle is suspended from hoist operating on a monorail

Fig. 8—Castings removed from the slinger line are carried to the cleaning department by overhead chain conveyor

Fig. 9—Pusher removes drag from mold conveyor onto shakeout



Good Working Conditions

built above the work areas so as not to interfere with equipment or production layouts. These rooms, finished with terrazzo floors and glazed tile walls, employ overhead baskets and hangers for storage of employees' clothes. Refrigerated drinking water fountains are spotted at convenient locations on the main floor.

General housekeeping of the plant follows in the main the rules embodied in the "Code on Good Housekeeping" of the American Foundrymen's Society. Indicative of the standards maintained in this regard is the fact that in six of the first eight months' operation of the Memphis Works the foundry won the plant-wide good housekeeping award. Matching the high standards of housekeeping is an effective safety program, the success of which to date can be attributed to several factors. As indicated previously, the foundry was designed to be safe. Secondly, the supervisory staff has an active interest in supporting established safety measures and, finally, the large majority of the employees had no previous foundry experience and were trained from the start in the safe way to perform their duties. The combination of these factors is reflected in a good safety record.

Emphasis on safety at (*Please turn to page* 152)

Fig. 13—Transfer ladle being filled at a cupola. Furnaces are tapped continuously into large holding ladles

Fig. 14—Rear view of the two hot-blast cupolas. Slag flows to this water tank from which it is removed by bucket elevator

Fig. 15—Charging buckets on conveyor cars are spotted below metal and coke chutes in accumulating cupola charges

Fig. 16—Making up the cupola charge. Scrap and pig iron are dropped through openings in platform to charging bucket below. Adjoining bins hold coke and stone

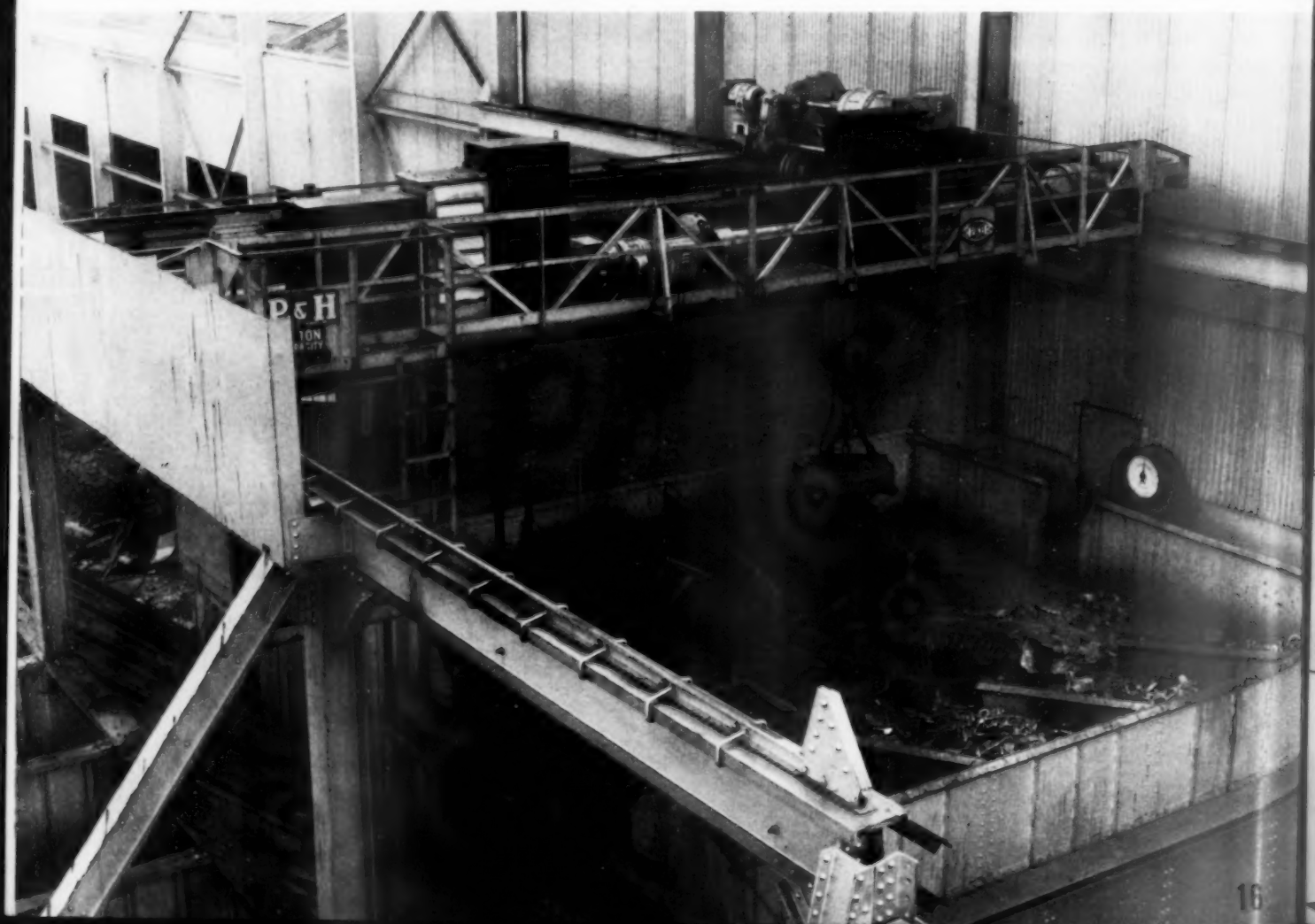
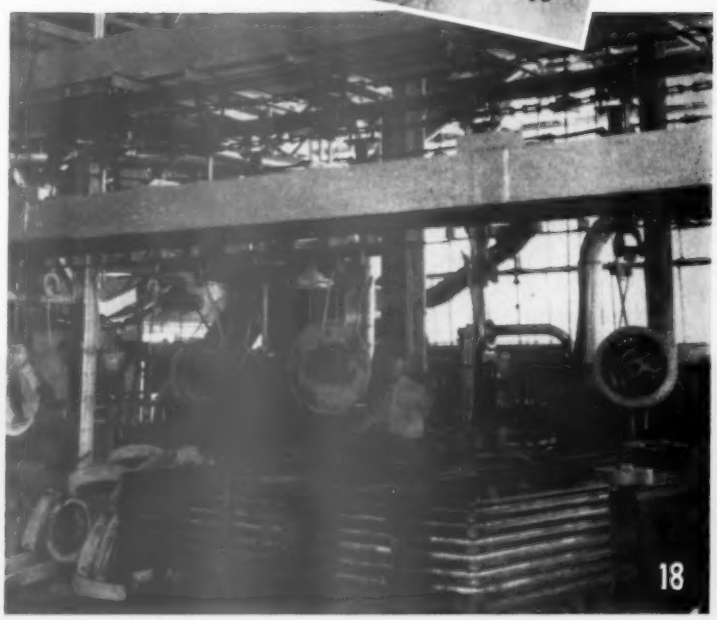
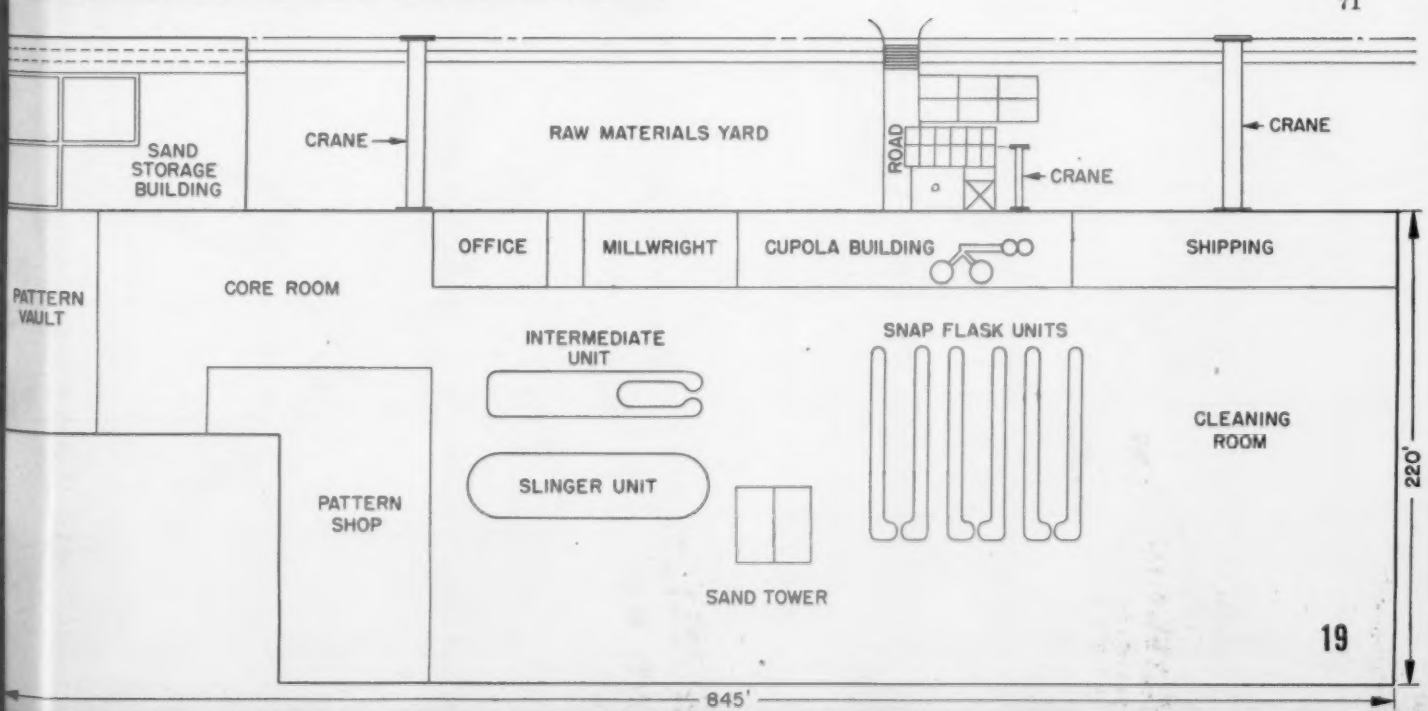


Fig. 17—Sorting small castings on apron conveyor leading from squeezer molding units

Fig. 18—Large castings are carried by this monorail chain conveyor through airless blast chamber

Fig. 19—Layout showing location of principal departments at the Memphis foundry





DYNAMIC VS. STATIC P

OF LOW-ALLOY C

Purpose of the investigation described here is not to predict impact strength from the static properties of the material but to determine to what extent the impact value varies for given static properties. It is shown that the impact value, irrespective of composition, is related to both tensile strength and reduction of area. In the quenched steels the relation is close enough so that no great differences of impact strength are observed for given static properties

STEEL castings are purchased on the basis of tensile properties and are frequently used under embrittling conditions. In such cases the notched bar impact test more nearly describes the service conditions than does the tensile test. In order to correct the data from the tensile test to something more like conditions of use, or to aid in writing specifications incorporating Charpy values, it is important to know the relation or relations which exist between Charpy number and commonly determined mechanical properties.

Possible relations of this nature can be found in the literature [1, 3, 4, 5, 6]. Some of these relations are expressed qualitatively and others by equations or graphs. It is shown that Charpy value is inversely proportional to strength and directly proportional to ductility. The inter-relations of static properties are well known.[2]

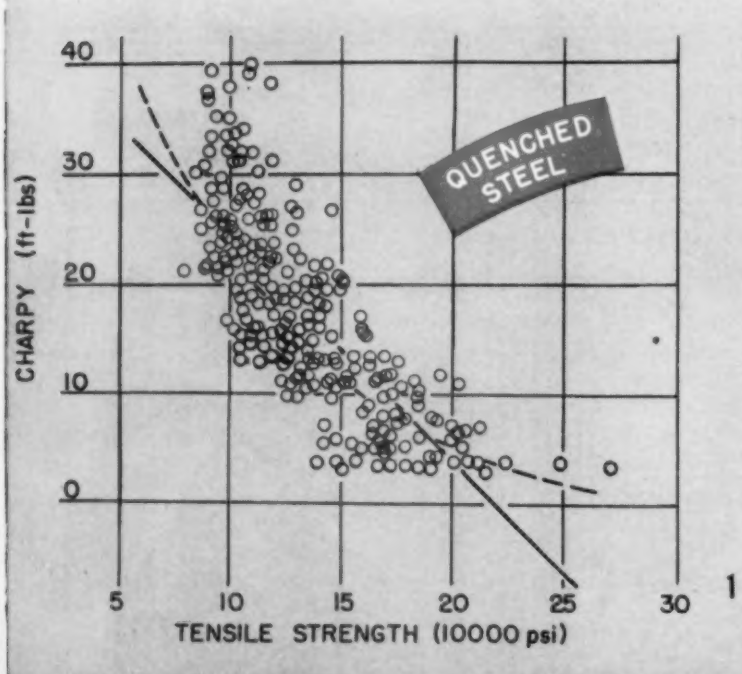
Unfortunately, the equations given are not shown to be the most useful nor are any data given which enable us to judge how well the equations fit the data. Therefore, we have no means of judging how accurately the various expressions can be used to predict Charpy values. The present work was undertaken to attempt to supply some information on these points.

It would seem from further study of the literature that microstructure or type of heat treatment may have some bearing on the problem [7, 8, 9].

The energy used in the Charpy test is the sum of the energies used in bending the specimen, in fracturing it and in casting the broken parts free of the hammer. In testing of metals the last is of little importance.

The energy used in bending the specimen is a function of the volume of metal deformed and the extent of the strains in this volume. Moser[10] has shown the variables which affect the volume deformed. By standardizing the size of the Charpy bar, the notch, the speed of testing and the temperature of test, these variations are eliminated. Then the volume deformed and the extent of the strains in the volume are functions chiefly of the material's ability to distribute stress in any direction.

The energy used in fracture is dependent on the fracture strength under the conditions of stress state,



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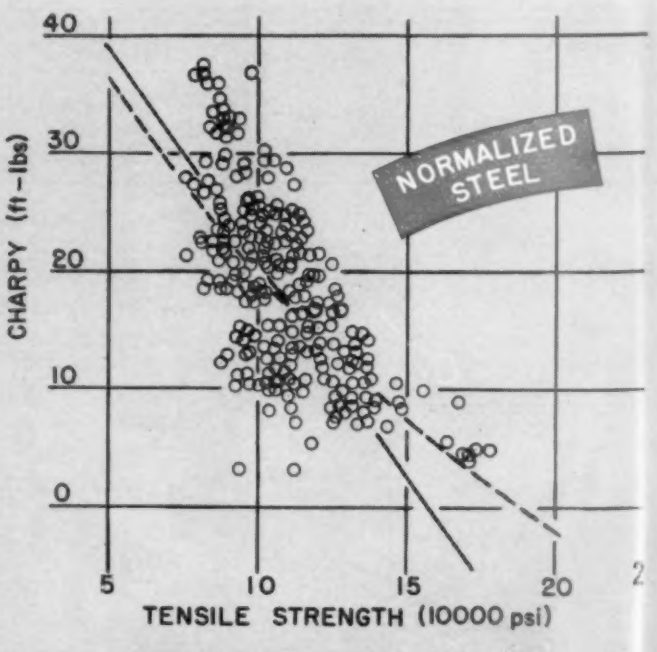


2

PROPERTIES

CAST STEELS

By W. K. BOCK
Research Engineer
National Malleable & Steel Castings Co.
Cleveland

strain state and strain history of the Charpy bar.

The static tension test does not produce any deformation like the Charpy test does and so gives no direct measure of the energy absorbed in plastic flow in the latter test. Moreover, the tensile test gives only one point on the fracture stress-strain curve and not on the curve for the metal in the state of strain which exists in the Charpy bar at fracture. A further complicating condition is that the tensile test up to the moment necking begins is conducted under essentially uniaxial stressing while the Charpy test is run under conditions of multiaxial stress.

Therefore, there are the relations between Charpy and static properties and among static properties on the one hand and on the other hand the fact the quantities involved in the Charpy test are not measured directly in the tension test. It would seem then that if any relation between Charpy value and static tensile properties is to be found it must be empiric.

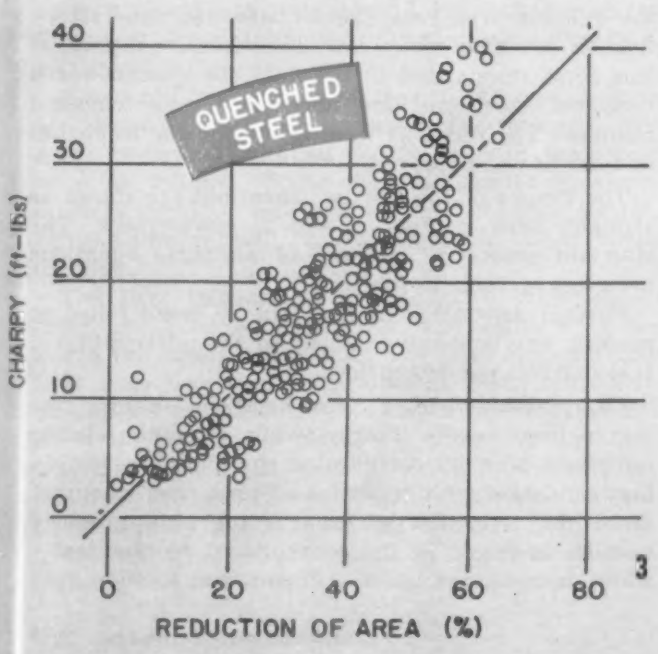
Before proceeding to a consideration of this question it might be well to consider the effect of microstructure. Quenched and tempered structures are essentially composed of a uniform matrix with almost spherical carbide particles embedded in it while normalized and tempered structures are essentially masses of ferrite interspersed with patches of pearlite. The former structure would seem better designed to deform uniformly in any direction, or, to use a parallel statement, better able to distribute stress in any direction.

Experimental Procedure—In the last several years a series of heats have been used for an extensive investigation of the properties of low-alloy cast steels. The present investigation covers the results of 24 heats made in the Cicero, Ill., plant of National Malleable & Steel Castings Co., or in the Sharon, Pa., plant of the same company. Most of the heats were made in acid electric furnaces but a few of the Sharon heats were from the basic open-hearth furnaces. Deoxidation was generally done with aluminum and calcium silicide, although three heats were killed with ferrotitanium instead, and two were not killed.

The compositions of the heats were selected by commercial considerations and cover as wide a range of composition as possible under the conditions. The use of production furnaces operating normally was preferred to the use of small laboratory units. The analyses are given in Table I.

A number of heat treatments were used on each heat in an effort to obtain as wide a range of properties as possible. Normalizing treatments consisted of normalizing from 900° C, from 820° C or from 900° C followed by a second normalizing from 820° C. The quenching treatments consisted of oil quenching from 900° C or normalizing and quenching temperatures had to be raised 50° C on heat 10 because of the higher critical points on this steel.

Figs. 1 through 4—Charts showing relationship between Charpy values and tensile strength and reduction of area for both quenched steel and normalized steel



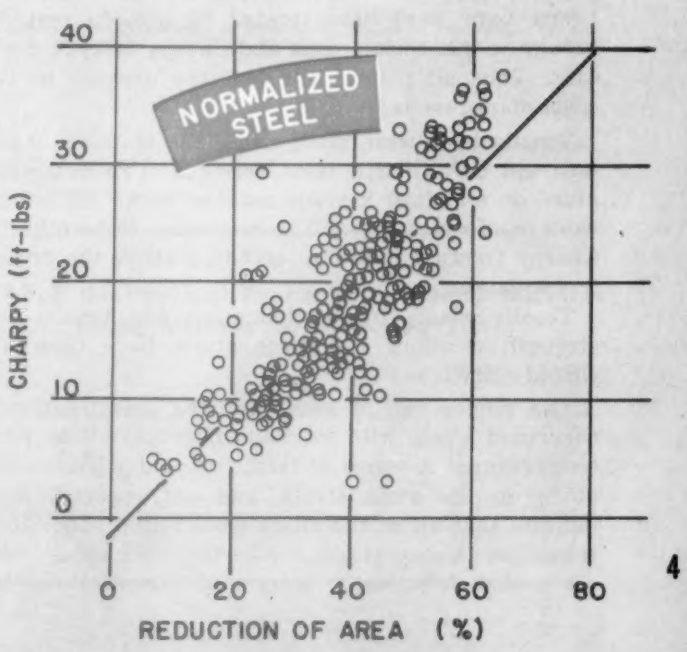


TABLE I—Analyses of Heats

Heat	C	Si	Mn	Ni	Cr	Mo	V	Cu
1	0.31	0.44	0.71	3.35	0.02	0.03	...	0.07
2	0.33	0.37	1.20	0.65	0.02	0.02	...	0.10
3	0.38	0.43	1.43	0.01	0.03	0.02	...	0.10
4	0.24	0.30	0.74	0.03	0.02	0.39	...	0.05
5	0.36	0.32	0.73	1.67	0.54	0.26	...	0.04
6	0.25	0.28	0.81	1.37	0.02	0.10	0.09	0.07
7	0.32	0.41	0.81	...	0.08	0.04	...	0.10
8	0.23	0.38	0.74	0.81	0.27	0.22	...	0.03
9	0.35	0.34	1.18	0.02	0.03	0.02	...	0.10
10	0.40	0.39	0.67	0.22	1.44	0.47	0.15	0.12
11	0.395	0.89	0.46	1.00	0.04	0.27	...	0.02
12	0.365	0.42	1.20	0.68	0.05	0.28	...	0.06
13	0.385	0.48	0.74	0.16	1.12	0.33	...	0.09
14	0.40	0.51	1.58	0.12	0.12	0.08	0.13	0.11
15	0.39	0.38	1.50	0.09	0.06	0.41	...	0.12
16	0.355	0.42	1.34	1.33	0.33	0.10	...	0.12
17	0.395	0.52	1.51	0.08	0.16	0.21	0.09	0.25
18	0.38	0.45	1.34	0.04	0.07	0.03	...	0.03
19	0.355	0.44	1.26	0.07	0.11	0.11	...	1.64
20	0.32	0.29	1.30	...	0.03	0.30	0.09	0.05
21	0.325	0.47	1.41	0.06	0.38	0.11	...	0.02
23	0.52	0.58	0.83	0.01	0.02	0.06	...	0.10
24	0.44	0.65	0.88	0.02	0.02	0.49	...	0.35
25	0.42	0.40	0.75	0.03	0.01	0.16	...	0.11

TABLE II—Standard Errors of Estimate*

Independent Variable	All Data	Quenched and Tempered	Normalized and Tempered
Tensile strength (linear).....	6.18	5.37	5.86
Tensile strength (curvilinear) ...	...	5.00	5.62
Reduction of area	4.27	4.03	4.34
Tensile strength and reduction of area	4.12	3.99	2.85

*Standard error of estimate is defined as the "root mean square" of the deviation of the observed from the calculated values. It measures the scatter of results about the predictions of the trend line. Thus the decrease in standard error of estimate from the upper left-hand corner toward the lower right-hand corner indicates the degree of improvement made when one abandons the assumption that the impact value is a straight line function of the tensile strength alone and assumes that it is dependent upon both tensile strength and reduction of area. It is impossible to show this improvement graphically since a three-dimensional figure would be required.

After normalizing or quenching, samples were tempered at 500°, 600°, and 700°. A 400° tempering treatment was added to the list for specimens normalized and oil quenched. Some bars were aged at 200° for 24 hours after oil quenching and tempering at 600° and after double normalizing and tempering at 600°. A few samples in both the normalized and tempered and quenched and tempered groups were water quenched from 600° after tempering. All temperatures are in degrees Centigrade.

For each heat treatment a sufficient number of 1-inch bars were heat treated to provide material enough to run tensile tests and Charpy tests in duplicate. Thus all points represent the average of two concordant results.

Tensile tests were made using the standard 0.505-inch test bar. Charpy tests were run at room temperature on standard keyhole notched bars. All testing work conformed to ASTM methods. Generally the Charpy fracture indicated breaking above the critical temperature.

Tensile-brinell, tensile-elongation and tensile-yield strength relations for these steels have been discussed elsewhere.[11]

The reader should note that the investigation is concerned solely with mechanical properties at room temperature. A series of tests run at dry ice temperature on the same steels, and not reported here, indicate that all of the steels were tested above their transition temperatures. All the specimens were air cooled from their tempering temperatures but spot checks made on specimens cooled by water quenching from the higher tempering temperatures indicated the absence of temper brittleness.

It may be well to point out that the heats did not have any peculiarities such that all the data from a given steel fell in any particular relation to the trend lines to be computed later. The assumption seems, therefore, to be warranted that there are no peculiarities of properties not indicated by our tests which would be measured by the impact test and not by the static test.

Statistical Investigation—The results were obtained from a mass of data consisting of almost 600 Charpy tests in duplicate and the corresponding tensile tests.

Since it is necessary to use empirical relations there are obviously an unlimited number of equations possible. The simplest most satisfactory equation is, of course, the one desired. More complicated equations are justified only if they produce an improvement to make the use of such an equation worthwhile. The linear relation between two variables is the simplest equation possible and was the starting point of this work.

In view of the large amount of data it will be necessary to use the methods of statistics to arrive at any conclusions. The methods are given in standard works on the subject[12, 13, 14].

Linear Charpy-Tensile Strength Relations—By calculating Charpy value for each heat as a function of yield strength, of tensile strength, of elongation and of reduction of area and determining the regression coefficient and standard error of estimate for each equation, it appeared that the regressions of Charpy on tensile strength and on reduction of area were the most promising. Since this is in line with the discussion above it was decided to work with the relations between Charpy and these two tensile test properties. An attempt to correlate impact value with the difference between yield strength and tensile strength also proved a failure.

The simplest relation involving Charpy value and tensile strength is (1): $C = a - bT$. An equation of this type was fitted using the method of least squares and all the data. Although significance tests showed the relation was real, the fit was not satisfactory from a practical viewpoint. Therefore, equations of this form were fitted to the data for quenched and tempered steel and for normalized and tempered samples. The relations were again not due to chance and the fit was improved.

The graphs of the last two equations are shown as straight lines in Figs. 1 and 2, respectively. The standard errors of estimate of all three equations are given in Table II, first line.

Further separation of the data by heats failed to produce any conclusive results so the advisability of this step was not established.

Charpy-Reduction of Area Relations—Before trying to improve the Charpy-tensile strength relation by means of more complicated equations the simple, linear relation with reduction of area was examined. Since the reduction of area is the only property usually measured in the conventional tension test—which is measured in the (*Please turn to page* 214)

Which Comes First... Core Oil or Water?

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FUNDAMENTAL core sand research necessitates a scientific survey of the sand mixing cycle. The *order* of ingredient addition together with the *time* of mixing is of the utmost importance, since both the reproducibility of test results and the economic use of sand addition agents are a function of the method used to mix the core sand. The tests described here reflect the influence on core sand properties of variations in both the order in which different ingredients are added to the mixer, and the total mixing time. Results are summarized in Tables I and II.

Ingredients of the mixtures employed in this investigation included core oil, cereal binder, tap water and a lake sand of 43 AFS grain fineness. Analysis of this sand showed 1.8 per cent retained on No. 30 sieve, 14.2 per cent on No. 40, 46 per cent on No. 50, 32.4 per cent on No. 70, 5.4 per cent on No. 100 and 0.2 per cent on No. 140. AFS clay content was 0.48 per cent. Mixing was accomplished in a laboratory muller with a 24-in inside diameter, speed of 42 rpm and muller wheel height above pan of 1/16-in.

A ratio of 100:1 (by weight) of sand to core oil and sand to cereal was used in every test. This weight ratio represents a volume ratio of 58:1 sand to core oil and 33 1/3:1 sand to cereal. Moisture content of the mixtures ranged from 1.8 to 2.1 percent. Each batch contained the following amounts of ingredients: Sand 25 lb; cereal binder 113.5 grams; core oil 113.5 grams; tap water 300 cu cm. In every case, the sand was weighed and distributed over the bottom of the cleaned, conditioned mixer as the first step in the mixing cycle test.

Seven different *orders* of ingredient addition were investigated. Two *time* cycles were employed. The seven orders of addition to the sand in the mixer were as follows: Water-oil-cereal; water-cereal-oil; oil-water-cereal; oil-cereal-water; cereal-water-oil; cereal-oil-water; and finally, all placed in the mixer together.

The first time-cycle test was made intentionally short in order to exaggerate any differences between the order of additions. The *total* cycle for this first time test was three minutes. Each ingredient was mixed for one minute in the order cited (except when all were added together). Obviously, the first ingredients added had a total mulling time of three minutes; the second, two minutes; and the last, but one minute. Table I shows the results of this test.

As indicated by this table, the best method of addition to a core sand is cereal-water-oil (Test 1694). This order of addition results in the best green and baked bond. When all of the materials were placed in the mixer at one time (Test 1696) the results closely approximated those obtained with the optimum practice. The third best method appears to be to add the ingredients as follows: Water-cereal-oil (Test 1691). A small amount of green strength is sacrificed when this practice is followed.

Obviously the poorest method of addition is: Oil-cereal-water (Test 1693). Here the moisture had but one minute to combine with the oil-coated cereal. The moisture content of this series of test ranged between 1.8 and 2.1 per (*Please turn to page* 190)

TABLE I—Physical Properties of Sand Mixtures (Three Minutes Total Mixing Time)

Test No.	Addition Order to Sand: First	Second	Third	Green Comp. (psi)	Green Comp. Air Dry (psi) 4.5 hr	Tensile Strength (psi), 105 min @ 425° F
1690	water	oil	cereal	.3	4.9	194
1692	oil	water	cereal	.4	5.1	189
1693	oil	cereal	water	.3	*	167
1691	water	cereal	oil	.4	12.4	265
1695	cereal	oil	water	.3	1.2	180
1696	All together			.5	24.2	265

* Too weak to handle.

TABLE II—Physical Properties of Sand Mixtures (Nine Minutes Total Mixing Time)

Test No.	Addition Order to Sand: First	Second	Third	Green Comp. (psi)	Green Comp. Air Dry (psi) 4 hr	Tensile Strength (psi), 105 min @ 425° F
1677	water	oil	cereal	.6	14.1	248
1671	water	cereal	oil	.6	47.5	266
1672	oil	water	cereal	.6	14.5	226
1673	oil	cereal	water	.6	35.0	234
1674	cereal	water	oil	.6	46.9	284
1675	cereal	oil	water	.6	21.5	234
1676	All together			.6	38.4	268

Machine M

By JOHN HOWE HALL
Consultant
Swarthmore, Pa.

Fig. 22—Revolving pattern or corebox drawing device

Fig. 23—Another type of corebox drawing machine

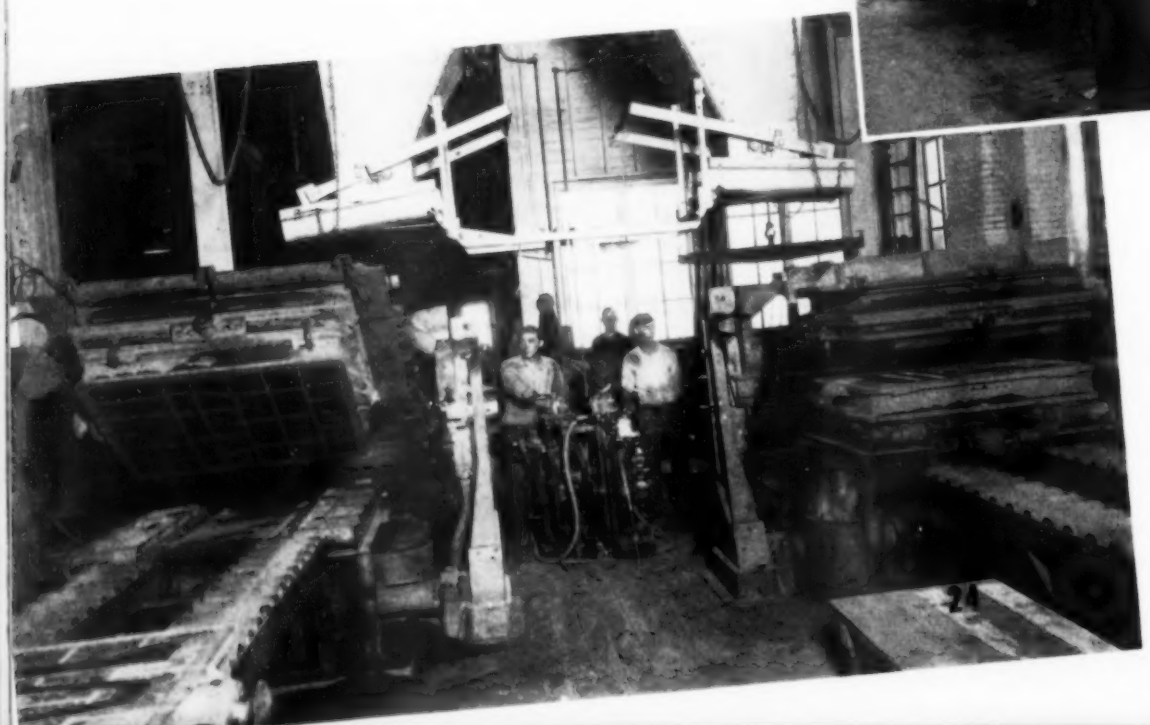


Fig. 24—Large jolt-rollover molding machines producing copes on left and drags on the right

e Molding OF STEEL CASTINGS

Use of roll-over and jolt-squeeze molding machines in the steel foundry is discussed in this third of a series of articles on the general subject of machine molding. The concluding article will be presented next month

IN roll-over devices handling heavy flasks, the plate that carries the pattern board should be recessed so that the latter may be set with its upper surface level with that of the carrying plate, or just below it. In other words, the plate attached to the roll-over arms should be a well-board, which takes the impact of the flask in jolting, leaving only the weight of the sand to be supported by the pattern plate. When patterns that do not fit the recess in the plate are to be mounted on the machine, the opening may be filled with an adapter plate that fits it snugly and gives the carrying plate a plain flat surface.

Instead of having the pattern drawing devices integral with the molding machines or mounted on the same foundations with them, they may be installed independently. Both the pin-lift and the roll-over-draw type are used and operated in the same manner as those mounted with the machines. For handling copes and drags made on jolters, these separate pattern drawing devices are not often installed, but for cores made on plain jolters, or large cores with one open side, made up by hand, they can be used to advantage. In this case, of course, one drawing device will serve several jolters, or hand ramming stations.

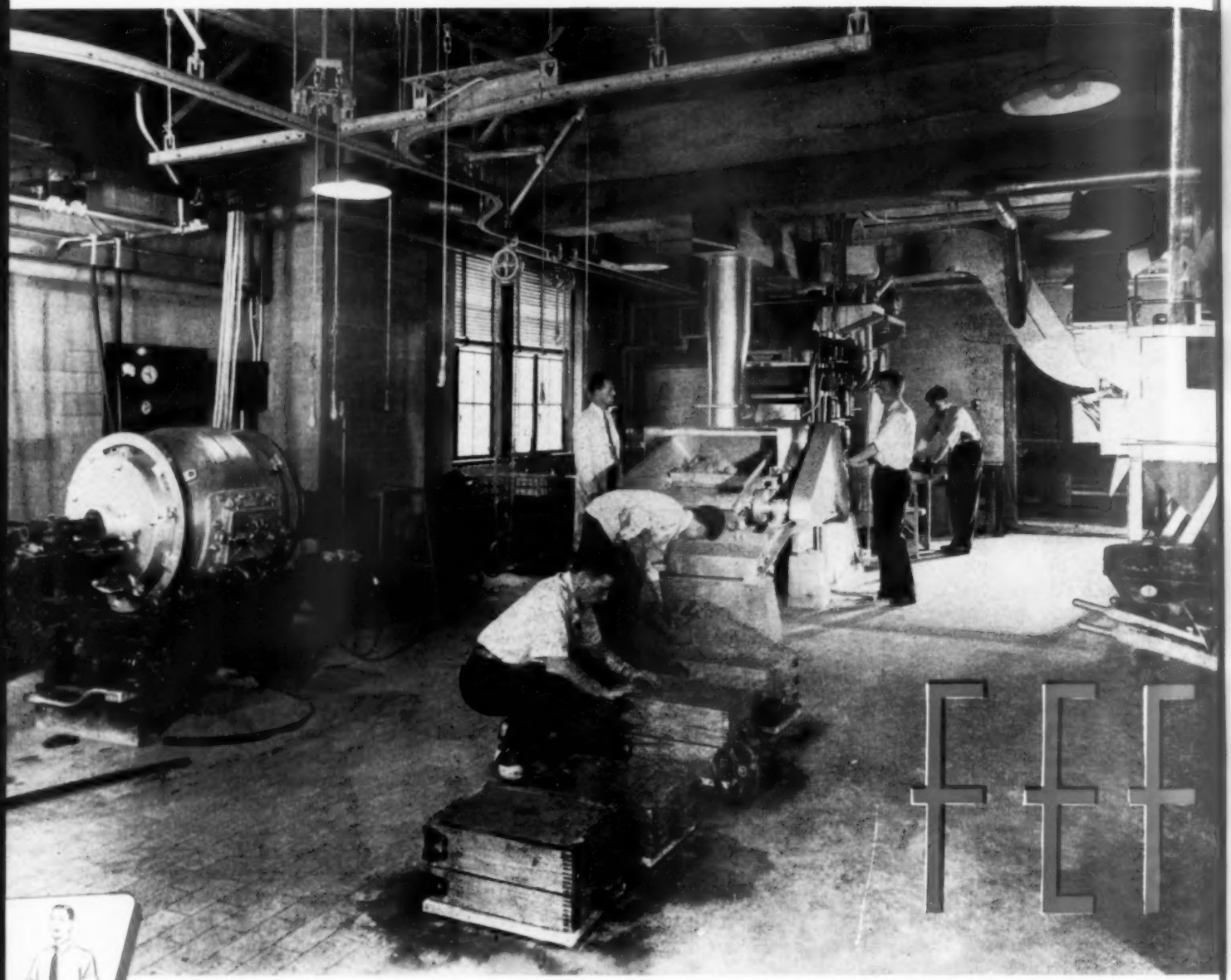
Incidentally, similar installations are also extensively employed in connection with molding machines of the slinger type, which will be discussed later. They may simply hold the drying plate on the box while the latter is rolled over and delivered to a conveyor where the box is lifted off by a hoist. To obtain the greatest benefit from the machines, however, they are designed either to lower the core and core plate away from the inverted box, or to lift the box off the core. In either case, vigorous rapping of the box with soft-headed mallets is usually required to loosen the core so that it will draw cleanly.

In place of lifting the box by means of a pair of pivoted arms, which requires the expenditure of considerable power, some roll-over machines are arranged to revolve as nearly as possible about the center of gravity of the whole assembly. One such device, shown in Fig 22, consists of a pair of steel tires set on rollers and connected by a framework which supports air-operated clamps. The boxes are rolled through the open end of the machine and gripped by the clamps, the whole affair is revolved on the rollers, and the box then released and pushed out at the other end. Usually no pattern drawing mechanism is incorporated in these machines, and they are used mostly for rather small boxes.

Larger and heavier coreboxes are rolled over and drawn on a machine that has a clamping cylinder and a draw cylinder mounted on a heavy vertical member, pivoted at the middle and supported on a rigid stand, as shown in Fig. 23. To roll the box over, the moveable vertical member is revolved on its pivot. These devices are in fair, though not perfect balance, and therefore require much less power than those that lift the boxes at the ends of a pair of arms. Machines of these two types, of course, can also be used to handle flasks made up on pattern boards, whether rammed up by hand, on plain jolters, or with machines of the slinger type. In some cases, heavy cores strengthened by stout arbors are lifted from the box by jacks fastened to the outside of the box and acting on bars passed through hooks attached to the arbor. This practice is quite often followed in handling fairly heavy cores that are conveyed to drying ovens on cars or overhead trolley rails, and partially or completely dried before being placed in the molds. To lift cleanly, these cores must be carefully gaggered and the lowest layers well rammed.

In using cement-bonded sand, it is not possible to lift copes off of pattern boards, because the sand when first rammed is so weakly bonded that it would fall out of the flask. Molds made in flasks, therefore, must be drawn on devices that lower the flask away from the pattern plate. Because of the difficulty of knocking cement bonded sand out of flasks, however, the latter are seldom used in this practice, but core molding is substituted. In that case, of course, the corebox is rolled over on a plate and lifted off the core, or the latter is lowered away from the box, depending upon the type of machine used.

As mentioned earlier, (*Please turn to page* 166)



Foundry scene at Northwestern Technological Institute, Evanston, Ill., one of the FEF schools

SUCCESS of the Foundry Educational Foundation's program during its first three years of activity has encouraged the trustees to expand this program to five additional schools. These would make a total of 12 engineering schools participating in the FEF work, all of them located in areas where the heaviest concentration of the foundry industry exists. More than 70 per cent of the country's engineers are also employed in these areas.

Additional schools which have been proposed for entrance into the FEF next May 1 are Michigan State College, University of Missouri School of Mines and Metallurgy, Ohio State University, Pennsylvania State College and Purdue University.

Trustees of the FEF see evidences of success in their program even though the period of activity has been brief. This is the first year in which any appreciable number of engineering graduates who held scholarships at foundation schools have become available to the foundry industry. Complete data on placement of 1949 graduates are not yet available but latest figures show 16 scholarship graduates have entered the industry. This figure is supplemented by 22 non-scholarship holders from FEF schools, plus 14 from the proposed five new FEF institutions and 15 from other engineering schools. In addition to graduate placements 129 undergraduates of all schools applied this year for summer employment in foundries.

Summer workers include 52 scholarship holders, 63 non-scholarship holders from the 12 existing and proposed FEF schools and 14 from other schools.

The FEF has made available 290 one-year scholarships for the first three years of its operations at a cost of approximately $155,000. Of these 148 have been awarded to date, involving 102 individuals, some

of whom have received scholarships for more than one year.

From the schools already identified with the FEF program—M.I.T., Cornell, Wisconsin, Cincinnati, Case, Northwestern and Alabama—about 1870 engineering students who took courses of some sort in foundry work were graduated this year. Practically all of these graduates, whether mechanical, electrical, metallurgical, industrial, chemical, or engineering and business administration graduates, have a new awareness of the foundry industry and a more favorable opinion of its possibilities. This arises from the fact that all of these students have been exposed to some of the foundry subjects which now are available in these schools from the freshman through the senior year. Many of them have attended special lectures and meetings addressed by members of the foundry industry, and some have had the benefit of plant inspection trips. With the addition of the five new schools, more than 5000 engineering graduates will be affected in this manner next year by the expanded program.

The FEF has provided the first direction toward a unified, though not standardized, program to improve education in the field of foundry engineering and operation. It has won the respect and co-operation of the colleges and is referred to in their catalogs in a manner to enhance the student's appreciation for the foundry industry as an opportunity for graduating engineers.

It has encouraged the first advanced and graduate foundry courses in the history of the industry, and its stimulus has been largely responsible for the first graduate students specializing in foundry problems. This growing esteem has even carried into other university courses only indirectly related to foundry subjects.

University recognition of the aims and purposes of the Foundry Educational Foundation and the sincerity with which it works through its industry advisory committees to aid students and staff members has brought numerous invitations to conduct seminars and short courses for members of the industry, creating a growing rapprochement with the engineering schools.

Although FEF's activities are directed chiefly at the college level, it has encouraged and shared in the efforts of local chapters of American Foundrymen's Society members to provide adequate high school and vocational school instructors and has sponsored orientation seminars which give students at this level an appreciation of the immense contribution of the foundry industry to the nation's growth.

While only a small proportion of the engineers graduated from the nation's universities may enter the foundry industry, the FEF believes the leavening process stemming from a dozen engineering schools will gradually improve the competitive position of castings. Greater familiarity with the possibilities of castings is expected to have its effect on design engineers, even if such knowledge is not extensive.

In order to continue and expand its program of fostering and improving education in foundry engineering, the FEF will open in October a campaign for $400,000. The period for which the funds are sought extends from May 1, 1950 to May 1, 1952. Next May 1 marks the end of the three-year period for which funds were provided in the first campaign when more than $300,000 was pledged. The new campaign goal is based on a program to supply one engineering graduate with a foundry option every year for each thousand men in the industry, or about 400 graduates annually.

Stowell Wasson, president of the Foundation, has appointed Homer Tielke, vice president and general manager of Crucible Steel Casting Co., Cleveland, as general campaign chairman. Mr. Tielke, who is chairman of the Educational Committee of the Steel Founders' Society of America, will name vice chairmen from the Gray Iron Founders' Society, American Foundrymen's Society, Malleable Founders' Society, Non-Ferrous Founders' Society, the Foundry Equipment Manufacturers Association, and from his own society.

A series of regional meetings will be held in more than twenty cities during the course of the campaign at which the accomplishments of the Foundation will be reviewed and its future program outlined. Local chairmen will organize groups in each area to seek pledges from Foundation members and special gifts from industries closely related to the foundry industry.

Cities selected for campaign meetings are: Minneapolis, Rock Island, Rockford and Peoria, Ill., St. Louis, Indianapolis, Chicago, Milwaukee, Muskegon, Mich., Detroit, Columbus, O., Cleveland, Cincinnati, Erie, Pa., Buffalo, Syracuse, N. Y., Boston, New York, Bridgeport, Conn., Philadelphia, Baltimore, Pittsburgh and Birmingham.

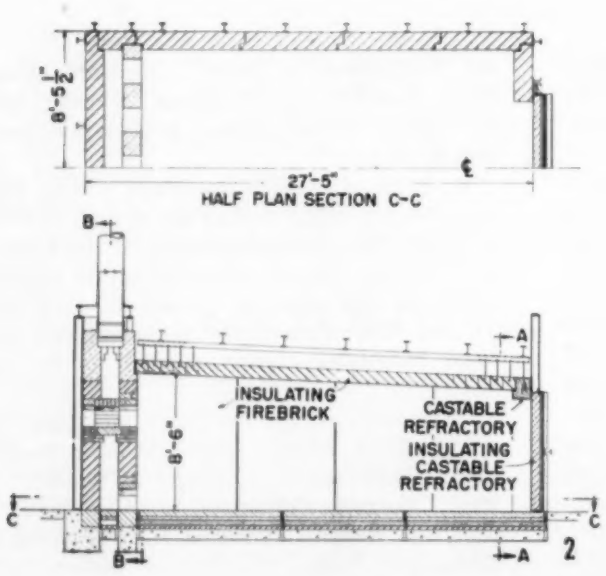
Progress

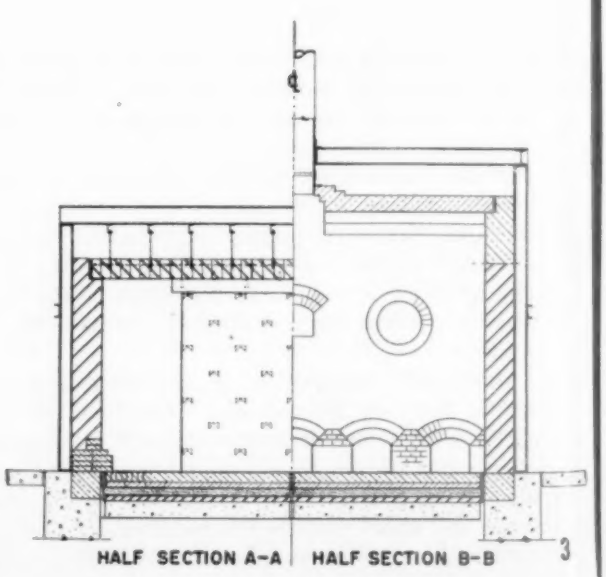
LEADS TO EXPANDED PROGRAM

By RAY A. WITSCHEY
Ceramic Engineer
A. P. Green Fire Brick Co.
Chicago

REFRACTORY PRACTICE

In the Whiting-Cole Recirculating Annealing Oven





DURING the last few years the malleable iron industry has seen the introduction and acceptance of a recirculating periodic annealing furnace oven known as the Whiting-Cole oven, developed by Ralph N. Cole of the Canton Malleable Iron Co., Canton, O. Its operation and construction were briefly described in THE FOUNDRY (December, 1946, page 126.)

As in every industrial furnace operation a suitable refractory enclosure was necessary for this oven. It was necessary to use a refractory enclosure that would be conducive to carrying out the malleable cycle desired and enhance the metallurgical advantages offered by a well conceived design. The excellent performance of the initial three units at Canton Malleable was due to a large extent to good refractory construction as well as operational practices.

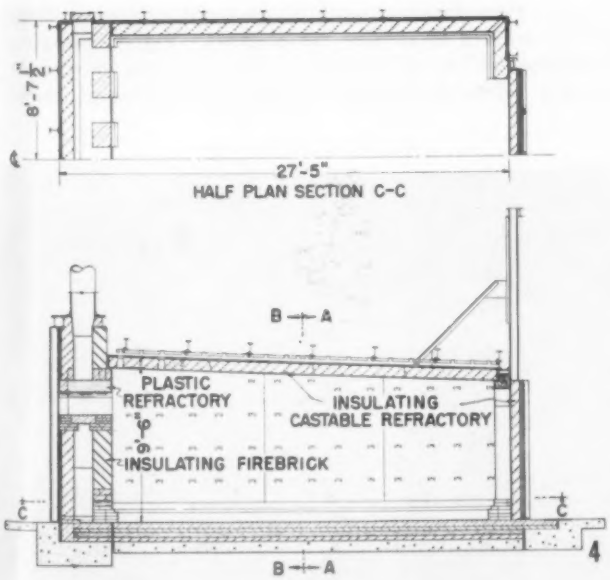
Long before the development of the Whiting-Cole oven, malleable operators demonstrated that better annealing cycles were possible in the conventional periodic annealing oven by the use of suitable refractories. It was found that suitable combinations of insulating firebrick and insulation were particularly advantageous. It was found that such combinations not only resulted in fuel economies but enabled operators to go another step toward the malleable operator's goal of a shorter annealing cycle. This was due to a large extent of course to the lower thermal conductivity of these refractory combinations which reduced heat losses by conduction through the refractories, and combinations that exhibited low heat capacity. The matter of proper selection of these combinations has been fairly well established in periodic practice as well as in the many types and designs of annealing oven equipment employed in continuous and short cycle practice.

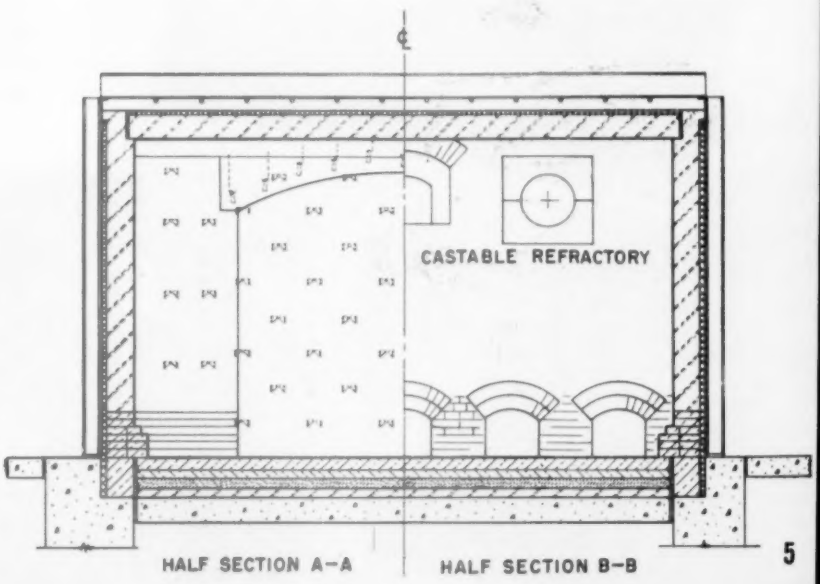
The advantages of properly selected refractory combinations were of particular importance in the early development of the Whiting-Cole oven because of the necessity for flexibility of

Fig. 1—Recent installation of recirculating annealing oven. Arch and side walls employ insulating firebrick; the combustion chamber was constructed of plastic refractory

Figs. 2 and 3—Sketches showing principal construction details of oven illustrated in Fig. 1

Figs. 4 and 5—Details of an oven in which side walls and arch were built of insulating refractory castable and insulation. This unit is shown in Fig. 13





operation and the quick response to changes in annealing cycle made practical by the design employed.

One of the features of the original units was the adoption of a flat arch construction. The generally used sprung arch construction has certain structural limitations. The thrust of such an arch makes for additional vertical stresses on side walls. Likewise, greater horizontal stresses make it necessary to provide heavier steel and adequate buck-stay protection.

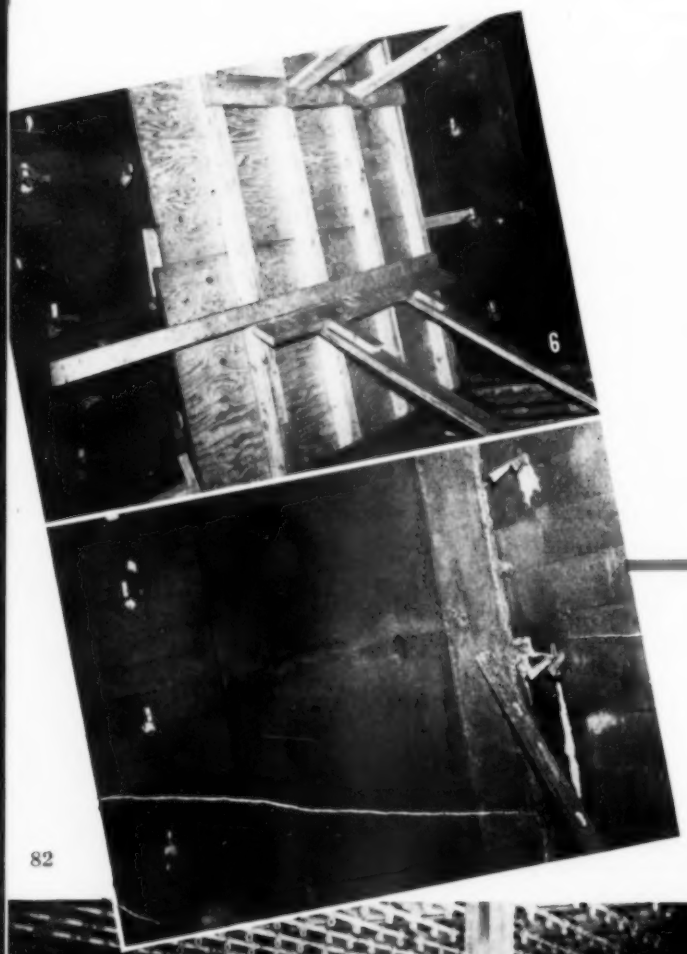
The flat suspended arch construction overcomes these difficulties in that it is a separate and accessory part of the structure. Moreover, the flat arch lends itself to easy and economic maintenance. All these features are particularly advantageous on a wide span such as employed on these furnaces.

The initial units were constructed of insulating firebrick in both side walls and flat arch. Briefly stated these ovens were constructed of 13½-in. insulating firebrick walls covered on the outside with a thin coating of plastic insulation. The roof or arch was a 9-in. insulating firebrick flat arch covered with a thin coating of plastic insulation and a 2-in. coating of loose insulation. Floor construction consisted of an 8-in. bed of slag concrete on which was laid a flat 2½-in. course of 2300° F insulating firebrick, 4-in. of refractory castable and 4½-in. of intermediate quality, hard-burned firebrick laid in rowlock courses. Provision for expansion was made between bottom and the 2300° F insulating firebrick side walls. The 13½-in. insulating firebrick walls rested on slag concrete footers 11-in. below the floor surface of the oven.

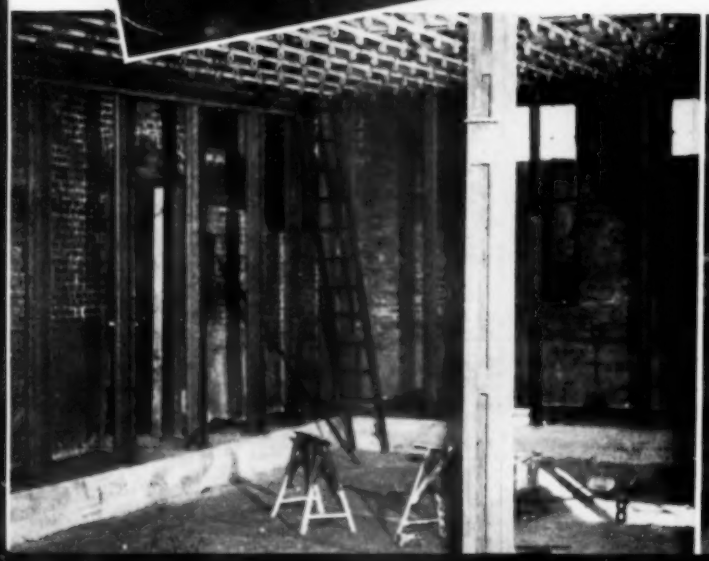
A recent installation similar to the original ovens in construction is shown in Fig. 1. This oven was similar to the original installation in that the side walls and arch were of insulating firebrick. However, this unit differs in certain detail. Heavy firebrick was used in the jambs. Lower side walls were constructed with heavy firebrick protruding beyond the wall surface to give protection to the side walls during the loading and unloading of the oven. Fan openings were constructed of standard refractory shapes whereas those in the original units were built of monolithic castable refractory shapes. The combustion chamber was constructed of plastic refractory instead of fireclay tile.

The construction can be further illustrated by typical drawings (Figs. 2 and 3). Here are illustrated many of the features employed in all the installations discussed. Note particularly the construction of flat arch, door lintel, fan openings and combustion chamber.

Still other refractory practices were incorporated



Figs. 6 and 7—Method of placement of side walls in oven depicted in Figs. 4, 5 and 13



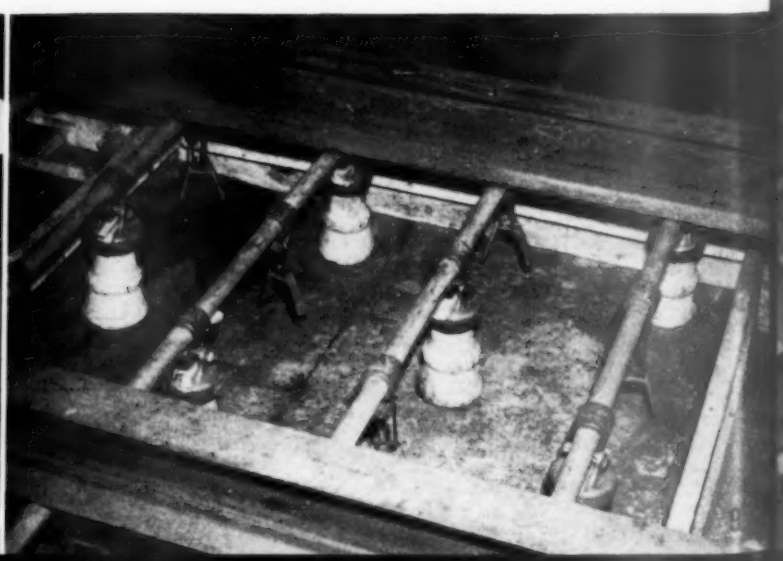


Fig. 8—Illustrating construction of insulating refractory castable arch. Here the steel work and anchor support castings have been erected to receive the anchors. Fig. 9—Showing the complete anchor arrangement with the form placed to receive the refractory castable. Fig. 10—A poured panel

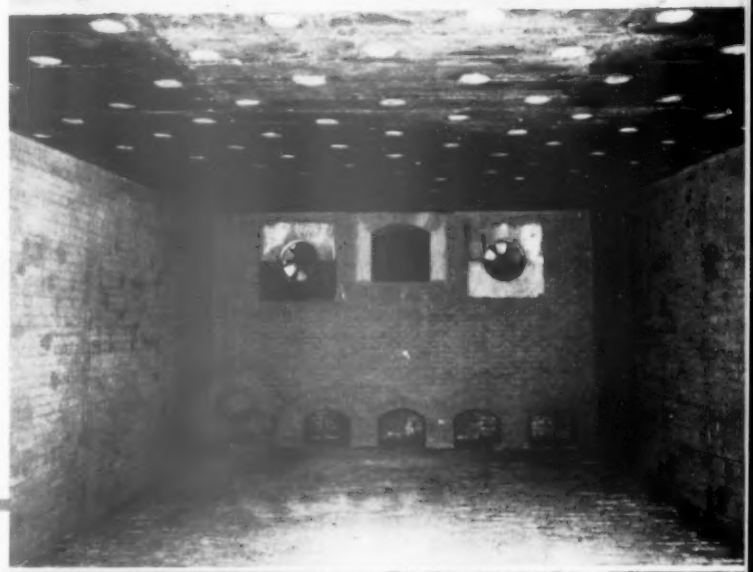
in three ovens constructed at another plant. These ovens were similar in design to the original units except for one outstanding feature—that being a flat suspended monolithic insulating refractory castable arch instead of an insulating firebrick arch.

The construction of these units is illustrated in Fig. 11. The exterior construction which supports the monolithic insulating refractory is of particular interest. Further refractory construction details are shown more clearly in Fig. 12. Note in this instance that the wall section surrounding the fan openings is constructed of refractory castable and the combustion chamber is constructed of plastic refractory. Note the double arch construction over the five bridge wall openings. Jack arch construction has been employed for this service but the double arch construction offers the advantage of simplicity and economy.

The most outstanding feature of these installations however, is the insulating refractory castable arch. Fig. 12 also shows the refractory castable lintel tile over the door opening. This arch is sectionalized and supported with refractory and alloy anchors in proper combination to give maximum stability.

The insulating refractory castable type of construction has several advantages. Monolothic construction, with elimination of joints, makes a tight enclosure. Insulating refractory castable lends itself (in combination with other insulating products) to the construction of any type wall composite desired. This permits any desired balance of heat loss —heat storage. Positive anchorage and provision for movement parallel to the wall surface insures that the refractories "live" with the fluctuating stresses of heating and cooling.

Further details of this arch construction are illustrated by photographs showing the actual construction of one of these arches (*Please turn to page* 244)



ready for application of additional insulation

Fig. 11—Exterior view of oven incorporating monolithic type refractory arch. Fig. 12—Interior of oven showing additional refractory construction details. Combustion chamber is insulated with plastic refractory

Fig. 13—Oven with monolithic side walls and arch. Construction details are shown in Figs. 4 and 5

DEOXIDATION OF WHITE CAST I

By RICHARD W. HEINE
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Madison, Wis.

THE principles set forth in the preceding article (THE FOUNDRY, August) are capable of extensive interpretation and application in the metallurgy of malleable irons. The role of oxygen as an element retarding graphitization of white cast irons can be related to many well known malleable iron foundry practices. Deoxidation may develop into an accepted practice applied to white cast irons. Some of the aforementioned possibilities will be discussed.

Methods of shortening and simplifying the annealing cycle have long been of practical interest to the malleable iron foundryman. Extensive research by many workers has resulted in foundry practices which have reduced the total annealing time considerably. The most rapid annealing is obtained in the so-called short-cycle malleable iron by carrying a high silicon percentage and a carefully balanced analysis. However, the danger of flake graphite formation during solidification arises, and as a result the most exacting engineering control is required to produce an iron which will anneal in about 35 hours. Short cycle malleable iron of high quality is produced in a few foundries where production warrants the equipment and engineering control required. However, these foundries do not represent the most general practice. The annealing cycle is still an extended one in foundries not producing the short-cycle type iron.

Deoxidation treatments were considered as a possible means of shortening the cycle. An investigation was made of the malleablizing characteristics of several different white irons with the view of conferring short-cycle annealing characteristics by means of deoxidizing treatments to irons that would otherwise require extended annealing. For this purpose, several white irons were prepared in an induction furnace using a charge of steel punchings, 75 per cent ferrosilicon, graphite, and sufficient ferrophosphorus and iron sulphide to obtain the desired composition. The charge analysis for these irons is shown in Table II.

The relatively high carbon content was selected intentionally to study an analysis which could be obtained directly from the cupola. The irons were poured into green sand molds to produce the standard ASTM tensile test bar for malleable cast iron. Just before pouring into the molds, the molten irons were treated with the deoxidizing additions listed in Table II. Prior to deoxidation, a blank was cast from each heat in order to compare the undeoxidized and deoxidized irons. The first stage graphitization time was then checked by the method described previously, with results as presented in Table II. These data are in reasonable agreement with the results of the original investigation. Deoxidation with zirconium produced results comparable to aluminum deoxidation, as expected.

A typical comparison of the undeoxidized and the deoxidized iron after five hours at the first stage graphitization temperature is shown in Fig. 20 for iron U. The addition of 0.24 per cent zirconium to the iron resulted in virtually complete first stage graphitization as shown in the right illustration in Fig. 20. In the same illustration the undeoxidized iron from the same heat exhibits pronounced resistance to nuclei formation and graphitization. The other irons responded to heat treatment with similar graphitization characteristics.

White cast iron tensile test bars from heats U, X, and Y_2 were given complete malleablizing heat treatments. Several malleablizing cycles involving a total heat treating time of 12 to 15 hours were attempted. A typical cycle consisted of heating to 1700° F in

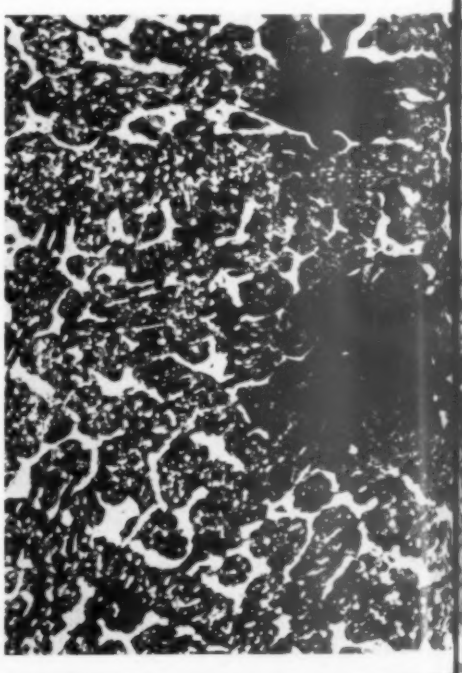


Fig. 20—Effects of zirconium addition on results of first stage graphitization treatments. Samples were held five hours at 1700° F and air cooled. Iron at right received 0.24 per cent Zr addition prior to pouring; sample at left is from same heat but with no addition. 150X, picral etch

T IRON

In this second and concluding article on the role of oxygen in malleable iron metallurgy, the author discusses the practical application and interpretation of the principles discussed in the August issue. Use of deoxidizers and relative deoxidizing properties of various elements are described

two hours, holding at 1700° F for five hours, cooling from 1400° F to 1275° F in six hours; the total time in the furnace being 14 hours. The tensile properties developed in the test bars were then determined. It was found that these irons readily met the ASTM 32510 specifications for Grade B malleable iron. These experiments proved that it is possible to develop a quick annealing malleable iron which will meet Grade B specifications using deoxidizing treatments under laboratory melting and annealing conditions. Furthermore, it was demonstrated that a white iron of relatively low silicon content may be annealed rapidly.

Whether similar results could be obtained under commercial foundry conditions is not known but it is hoped that this field may be investigated. Many additional factors are introduced by plant operations which might affect the results considerably. It cannot be overemphasized that the effects of melting practice and annealing cycle variables must be carefully examined in any particular foundry to make the most desirable use of deoxidation practices.

A more general evaluation of the possibilities of the deoxidation practices indicates several distinct applications which may prove worth while in the malleablizing process. These are discussed as separate points below:

1. The use of deoxidizers to obtain a rapid-anneal malleable iron. As shown by the aforementioned experiments, Grade B iron with the most rapid annealing characteristics may ultimately be developed in the foundry. It would seem that the low silicon and cupola malleable irons would be particularly benefited. Intermediate additions of deoxidizer seem to be best suited for this purpose.

2. The use of small deoxidizing additions to white cast iron intended for Grade A malleable irons to promote more rapid annealing and more favorable nodule distribution. The left-hand portions of the curves on Figs. 14 and 18 (August issue) show that a sizable reduction in first stage annealing time may be obtained even when the deoxidizing additions are small enough so that the effect of a decreased number of nodules occurs. A slightly higher tensile strength and ductility is usually associated with fewer nodules in the ferrite matrix. Small additions, less than 0.05 per cent Al, 0.05 per cent Ti, and 0.08 per cent Zr, for example, may serve this purpose. Such a practice is already carried on in some foundries where a ferro-boron treatment is applied regardless of the chromium content of the iron.

3. The use of deoxidizing (*Please turn to page* 239)

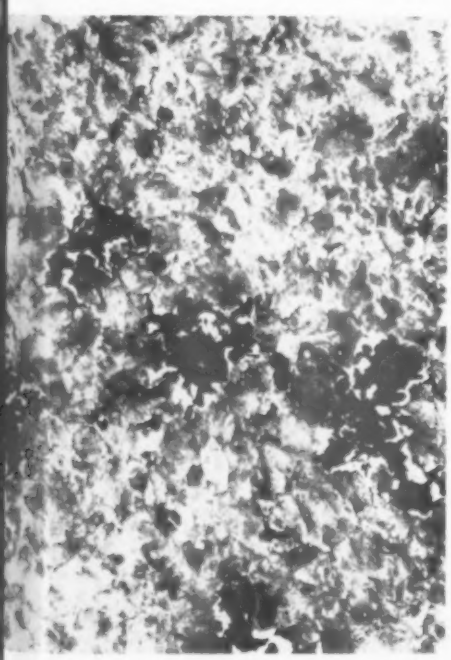


TABLE II—Charge Analyses of Irons Studied

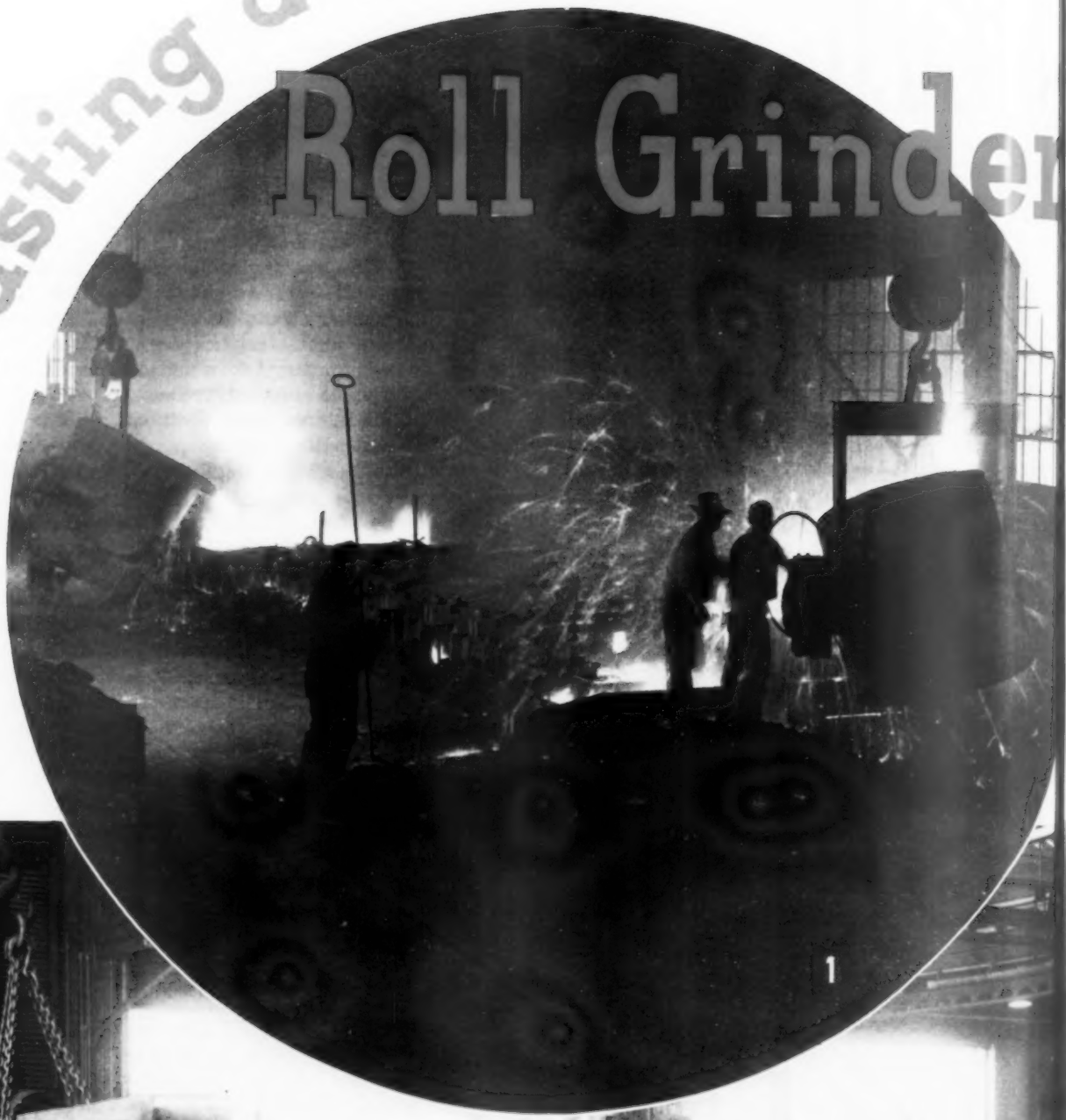
No.	Charge Composition % C	% Si	% Mn	% P	% S	Deoxodizer, Percentage Addition	Time Required for Complete First Stage Graphitization
X	2.80	0.90	0.40	0.14	0.10	0.077% Al	4 hours
Y1	2.80	0.90	0.40	0.14	0.10	0.11% Fe-Ti	8 hours
Y2	2.80	0.90	0.40	0.14	0.10	0.20% Fe-Ti	5 hours
Z	2.80	0.60	0.40	0.14	0.10	0.134% Al	7 hours
U	2.80	0.90	0.33	0.10	0.10	0.24% Zr	5 hours

TABLE III—Relative Deoxidizing Power of Some Elements*

Element	Residual Percentage by Weight Required in the Iron to Lower Oxygen in the Iron to 0.006%***	Distribution of Deoxidizing Element Required to Lower the Oxygen from 0.026% to 0.006%** Oxide	Total % Element	Per Cent Oxidized****	Atomic Weight	Ratio of Atomic Weight of Al to Other Elements
Silicon	1.0	SiO_2	1.0175	.0175	28.06	.964
Vanadium	0.272	V_2O_3	.3145	.0425	50.95	.53
Titanium	0.00198	TiO_2	0.03198	0.030	47.90	.563
Boron (Calculated from lowest and highest deoxidizing powers postulated)	0.00037 to 7.53×10^{-5}	B_2O_3	.0094	0.0090	10.82	2.49
Zirconium	7.29×10^{-12}	ZrO_2	0.057	0.057	91.22	.293
Aluminum	1.45×10^{-20}	Al_2O_3	0.0225	0.0225	26.97	1

* Values calculated from formulas presented by R. W. Gurry[7].
** The value 0.026% oxygen was chosen merely for illustrative purposes.
*** The value 0.006% oxygen was selected because it is the theoretical amount in equilibrium with 1.0% silicon if it is assumed that only SiO_2 is formed and the equilibrium constant of Korber and Oelsen is operative.
**** Equals total per cent, element minus residual per cent.

Casting a Long Roll Grinder F



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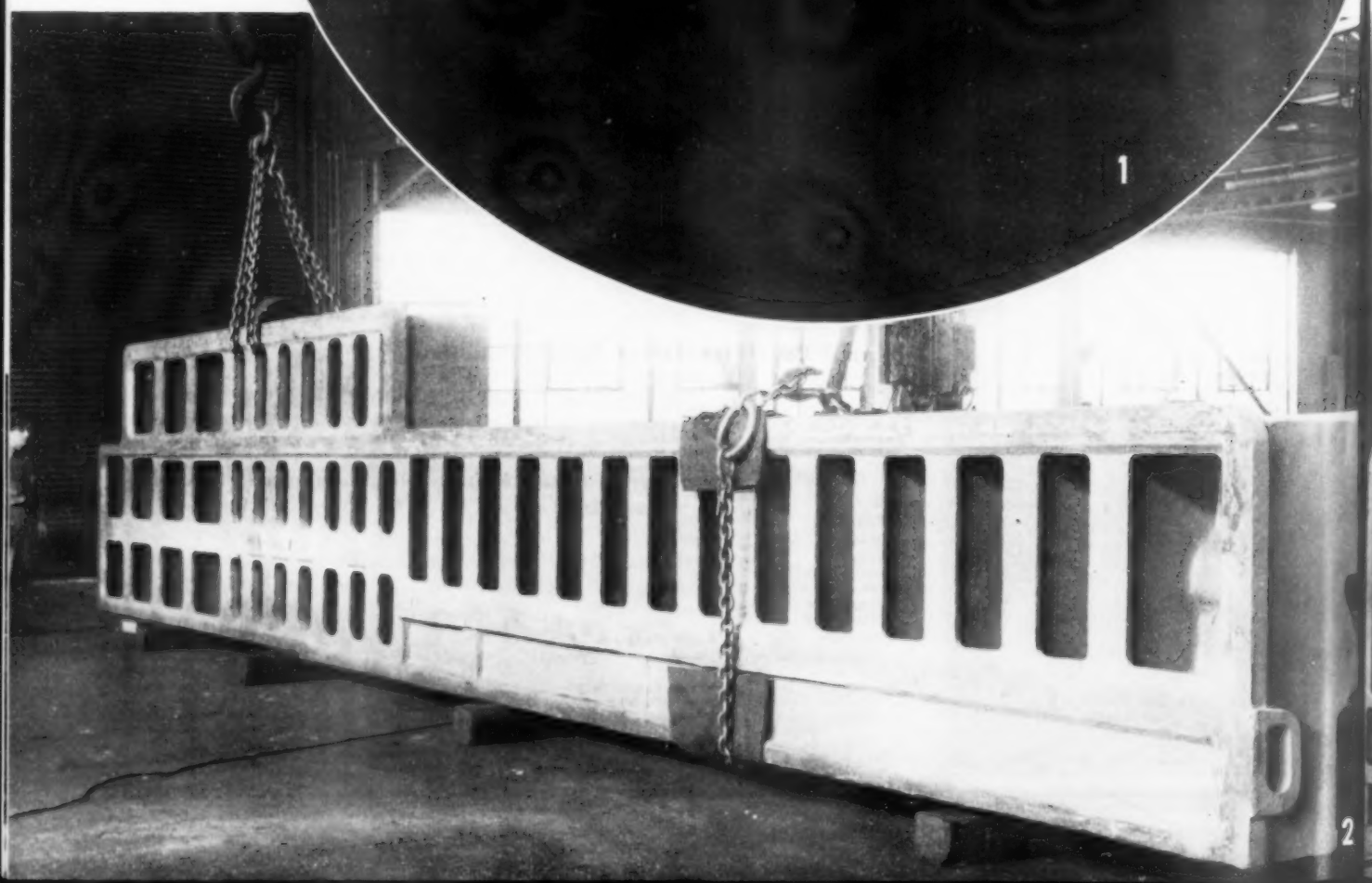

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By PAT DWYER
Engineering Editor
THE FOUNDRY

Bed

SEVERAL interesting features in advanced foundry practice are exemplified in a roll grinder bed recently turned out by the Landis Tool Co., maker of precision grinding machines, Waynesboro, Pa. Showing a cleaned weight of 58,020 lb, a total length of 42 ft, 9 in., and a freedom of warpage or shrinkage, the casting is the longest and heaviest produced in this plant up to the present. Foundrymen who have had experience with long machine tool castings are perfectly familiar with the fact that inevitably the beds will warp to a greater or lesser extent. This is due mainly to the difference in section thickness between various parts of the casting. For that reason the pattern is warped—"cambered" is the foundry term—in the opposite direction to that assumed by the casting while cooling and contracting.

In the official exchange paper of the Institute of British Foundrymen presented to the AFS convention in Philadelphia, May, 1948, E. Longden, works manager, P. R. Jackson & Co. Ltd., Manchester, England, discussed the subject of contraction and distortion in gray iron castings. Specific reference is made to the cooling behavior of a roll grinding bed 41 ft, 6 in., and an elaborate series of graphs are used to illustrate the behavior of the casting. Based on an extended series of experiments, the author prepared a graph showing the camber allowance on long castings.

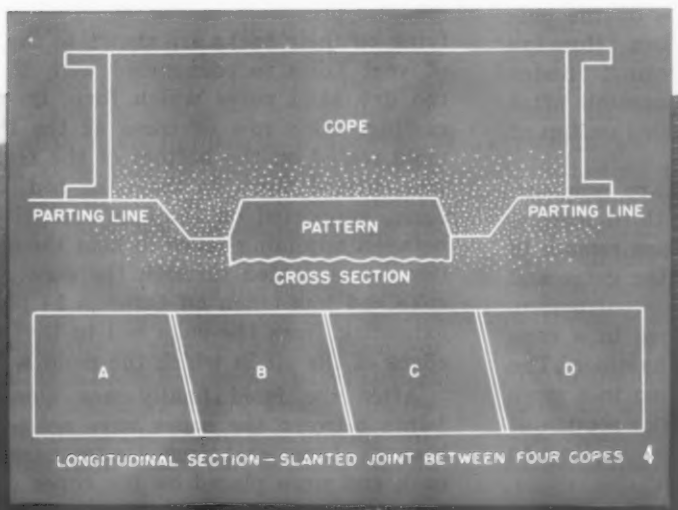
He was careful to point out the variable features which enter into this or any calculation. Camber allowance, other dimensions remaining constant, increases with an increase in the length of a casting; with a reduction of metal section of the vertical walls of the casting; with an increase in depth of the casting without any corresponding increase in length; is slightly increased with a reduction in width; and with an increase is the plated area on the lower face of the casting as poured. Camber allowance decreases with a decrease in the plated area on the top side of the casting, and is slightly modified with pouring temperature. Allowances increase slightly with lower temperature.

A form of instinctive knowledge gained only through long practical

Fig. 1—Pouring time for the large roll grinder bed was 70 seconds, employing three ladles

Figs. 2 and 3—Views from opposite sides of the finished casting. This bed is 42 ft 9 in. long and weighs 58,020 lb

Fig. 4—Typical cross section of the mold



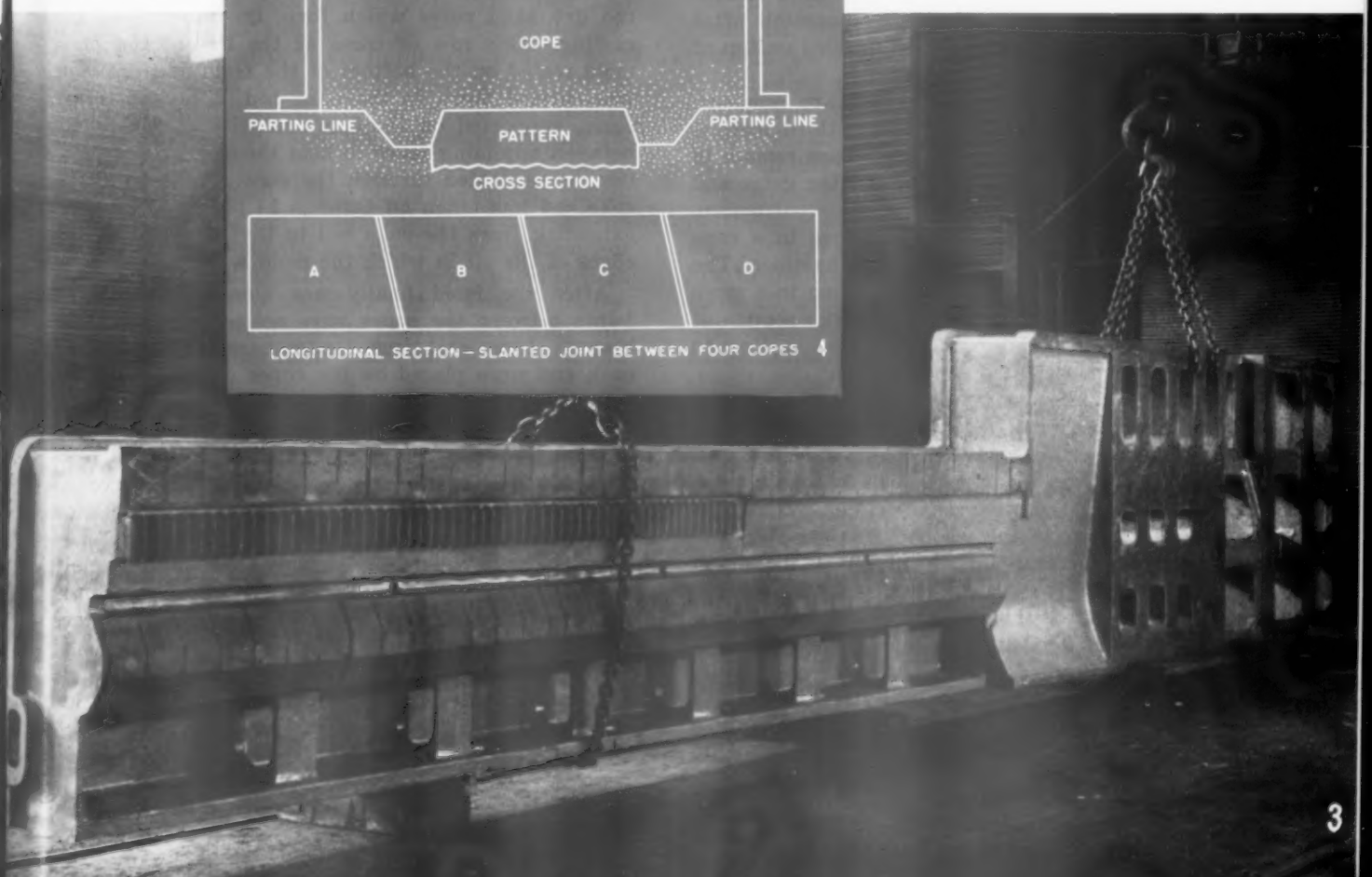


Fig. 5—Preparing the mold. Vent holes in dry sand cores match those in two of the copes shown on their backs at left

experience and close study is needed on the part of the man who sets the camber allowance on the pattern. In the shop vernacular, he visualizes "How far she'll go; and whether she'll go up or down." Binder bars and copes are removed as soon as possible after the casting is poured, but the sand is piled on top of the casting.

In another method, the binder bars are removed, but the copes are left in place. In a third method the binder bars are removed and the copes remain in place but the sand is dug away around the gates and risers to prevent any hindrance to free contraction. Where the gates and risers are too close to a cope bar, they are knocked off with a sledge hammer. The top of the casting contracts first according to a more or less definite rule. The bottom or heavier section of the casting contracts later and pulls the casting to the desired and anticipated straight line.

The foregoing general observations may be and probably have been skipped by two classes of readers: (a) Those who never have, are not now engaged in and never expect to be faced with the problem of producing a casting of this kind. (b) Those who are familiar with the job and who derive a certain amount of pleasure in spotting real and imaginary mistakes. They generously admit that the writer had a fair to middling knowledge of the trade and probably could get by under the sharp eye and sharper tongue of a leading hand. Personally they are inclined to write to the author and ask a few pertinent questions.

Perhaps a detailed description of the foundry technique applied to the casting shown in the illustrations may serve as a tranquilizing influence. A coke bed and a single course of sand were put down in the bottom of a comparatively shallow pit in the floor. Two rails were set down level and parallel. Sand was rammed and then scraped off flush with the tops of the rails to form a level bed. Dry sand cores to form the bottom face of the mold were laid on the sand bed. The cores were made in a sectional corebox with the predetermined camber on the face side. The pattern rested on the cores while sand was rammed against the side and end walls. Chills were rammed in the cores that formed the ways on the casting. This method is employed on castings of various lengths and is a decided improvement over the old job shop method of setting up the pattern on bricks and wedges. Upper ends of the vent pipes were protected by cast iron caps during the molding operation; shortly before the casting was poured the caps were removed. A handful of oily cotton waste was placed in the top of each pipe and ignited to burn the gas which was developed in the mold as it was filled with molten metal.

Since the copes were provided with plain, straight bars, it was necessary to ram the sand to the floor level, and then dig a parting along both sides. A sample cross section of the mold is shown in the accompanying free hand sketch, Fig. 4, not drawn to scale and with many of the details omitted for the sake of simplicity and cleanness.

Describes How Mold Was Assembled

A practically complete story of how the mold was made is presented in Fig. 5. Two of the four copes lying on their backs are shown to the left with a row of vent holes to correspond with the vent holes in the dry sand cores which form the interior of the casting. One row of cores at the left of the open mold rested on the bottom of the mold and the vent was carried down to the coke bed. The remaining cores, supported on chaplets and with stud chaplets between adjoining cores to hold them in proper position, were vented through the cope. Vent from the coke bed was taken off through 14 pipes, 7 to a side, extending from the coke bed to the joint line at the edges of the pit in which the mold was made.

After the mold finally was closed, the tapered joints between the copes were sealed with sheet asbestos. Long cast iron binder bars with a slot in each end were placed on the copes and anchored by bolts attached at the lower end to similar bars in the bottom of the pit. In the course of constructing the lower part of the mold, cast iron standards resting on a solid foundation were set up to serve as rigid bearings for the copes. With this construction the nuts on the binder bar bolts could be tightened down without causing the copes to crush the mold along the top edge. Incidentally, it may be pointed out that rigid bearings for the cope are even more necessary where weights are employed instead of binders and bolts. Merely as a personal opinion, binders and bolts are to be preferred to a collection of huge weights, usually selected by guess, and usually in excess of requirements (*Please turn to page* 220)

Care of molding machines

Points to be observed in the proper maintenance of molding machines are discussed in this paper presented by the author before the Philadelphia Chapter of the American Foundrymen's Society

By RAYMOND SHIRE
Tabor Mfg. Co.
Philadelphia

WHEN the average individual buys an automobile, he usually inquires, or reads the instructions, to find out what type of oil he should use, how often he should change oil, what air pressure he should carry in the tires, and numerous other things. But when a foundry receives a new molding machine, it is put in its location, a man is assigned to operate it—and, too often, that is all. Actually it is most important that an effort be made to know how and when to service these machines.

One of the popular types of molding machines is the jar squeezer. There are four different styles, and each one requires a little different attention. Some squeezers have internal guide rods and others have external guide rods. The external guide rod requires more attention because it is exposed to the sand and dust, and is more apt to collect dirt and moisture which will corrode and cause a sticky guide rod; this in turn will have some effect on the jarring unit. Some foundrymen ask why the manufacturers don't put a cloth guard around the guide rod. Well, if this were done, the user would forget to drop the guard for inspection. With the guide rod unguarded, he at least can see what is collecting on it.

When stationary machines are used, they are frequently buried in sand and operators must be directed to keep as much sand as possible away from guide rod. Have them blow it clean at the end of the.

Oiling Procedure Is Outlined

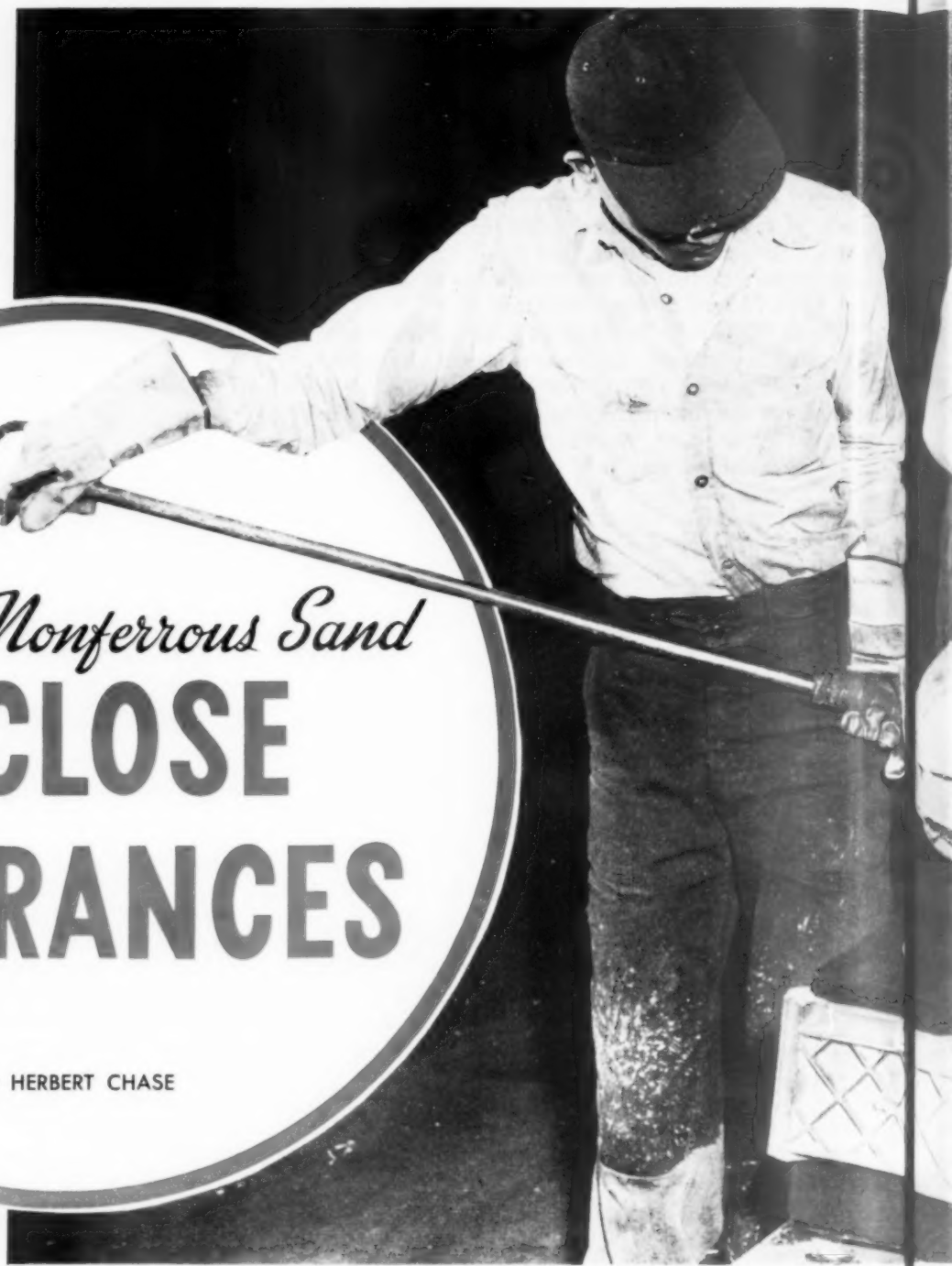
The squeezer with an internal guide rod requires far less maintenance, and it is only necessary to oil it when the jar piston is removed for complete check. However, it is important to oil the jarring piston daily. In severe cold weather it is advisable to use one-half kerosene and one-half oil. The user also should know what kind of a squeeze piston the machine employs; some have full-length pistons with rings and others have shallow pistons with a cup leather. The majority of squeezers are 10-inch squeeze pistons but there are also some 12 and 13-inch squeezers.

It must be realized that in oiling the squeeze piston, it is necessary to put enough oil in the oiler to run it completely around the oil groove in the piston. For example, when oiling a 10-inch squeeze piston, enough oil must be used to travel 32 inches around the circumference. Many make the mistake of putting only a few squirts in the oiler, consequently the back half of the piston receives no oil. Every three or four months, it is advisable to run a little kerosene in the groove; this will cut the oil and dirt that clogs the groove and keep it open for new oil. If the piston has a cup leather, it will be found unnecessary to oil the piston wall. But it will be necessary to put oil in the air line to the squeezer in order to get some oil around the cup leather. Manufacturers pack grease around the cup leathers and a little oil each day will keep the latter soft. If the machine has a cup leather, it will not be equipped with piston rings.

All squeezers require some grease. The cantilever type has the largest number of grease fittings while the yoke type has the least. Grease all points once a week and oil the machines daily at the end of the working day. This will give the oil a chance to work around and will protect the working parts from corrosion. Use a light grade of oil equal to SAE No. 10 for the vibrators. Every four or five weeks pull out the jar piston and clean out the cylinder; wash the piston off, oil and reinsert it. This requires only a few minutes and will give an opportunity to see what is collecting in the cylinder and to make sure the piston rings are free. Check all rubber air lines for deterioration. Sometimes the inner wall collapses and shuts off the air supply. This also can have an effect on the exhausting air. It will act like a check in the line and will cause the machine to exhaust slowly. Don't have too many turns in the main air line to the machine. This will offer resistance. And above all, watch for condensation.

Another popular machine is the rollover. Most rollovers have jarring units, some plain jar and others shockless jar. Some hand-ram rollovers are used under sandslingers or for shallow core work that is not suitable for jarring.

Jarring unit on the rollovers should be serviced in the same manner as with the squeeze jarring units. In this classification is the shockless type machine which has a different type of construction. It includes not only a jarring cylinder and piston, but also a much larger piston, which is called the piston anvil. The jarring cylinder is constructed in the piston anvil, which is a floating member. The anvil rests on heavy coil springs, and must be oiled daily. Again, it is important to know the diameter of the piston anvil in order to determine the amount of oil required to travel around the circum- (*Please turn to page* 148)



Producing Nonferrous Sand Castings to CLOSE TOLERANCES

By HERBERT CHASE

DIFFICULTY encountered by the Sperry Gyroscope Co. in securing nonferrous sand castings of exceedingly high quality and to close as-cast dimensional limits found essential in its own products led this company to establish and operate its own well equipped foundry, which is operated as a separate unit of its large plant at Great Neck, N. Y.

Although many castings made in this foundry are produced on a short run or strictly development basis, many others from quite small to those requiring flasks that measure as much as 6 feet in all three dimensions are turned out in quantities ranging from medium to long run. A considerable proportion of these are for Sperry's own products, especially for aircraft and marine applications. Many others, however, are for use in diversified industrial products.

About 60 per cent of the castings produced in this sand foundry are made of aluminum alloys, and about 90 per cent of the total aluminum tonnage is in the No. 356 alloy. Besides aluminum castings, many are made of magnesium alloys *H* and *C* and a considerable number and variety are cast of copper-base alloys. All Sperry aluminum and magnesium castings are heat treated.

All alloys cast are held to exacting specifications and analyses are constantly checked. Specimens for physical tests are constantly being made. Castings also undergo most careful inspection, often including radiographing (in some cases up to 100 per cent, if this is specified), and relatively minor defects are cause for rejection.

Virgin metals are used where specified, and ingots are stored indoors to be sure they remain dry and that moisture and gas absorption are minimized.

Sprues are marked with the alloy number and, when cut off, are segregated and go with runners, risers and rejected castings into tote boxes that are similarly identified. This metal is all transferred to a separate room where it is remelted in a reverberatory furnace, Fig. 3, refined and cast into ingots.

Each remelt heat is analyzed carefully and is given a number. Casting floor foremen are supplied with precise instructions as to the amount and type of virgin metal to be mixed with remelt ingots from a given heat at each furnce. Heats from these furnaces are also analyzed, and test bars are cast to make certain that casting specifications are met.

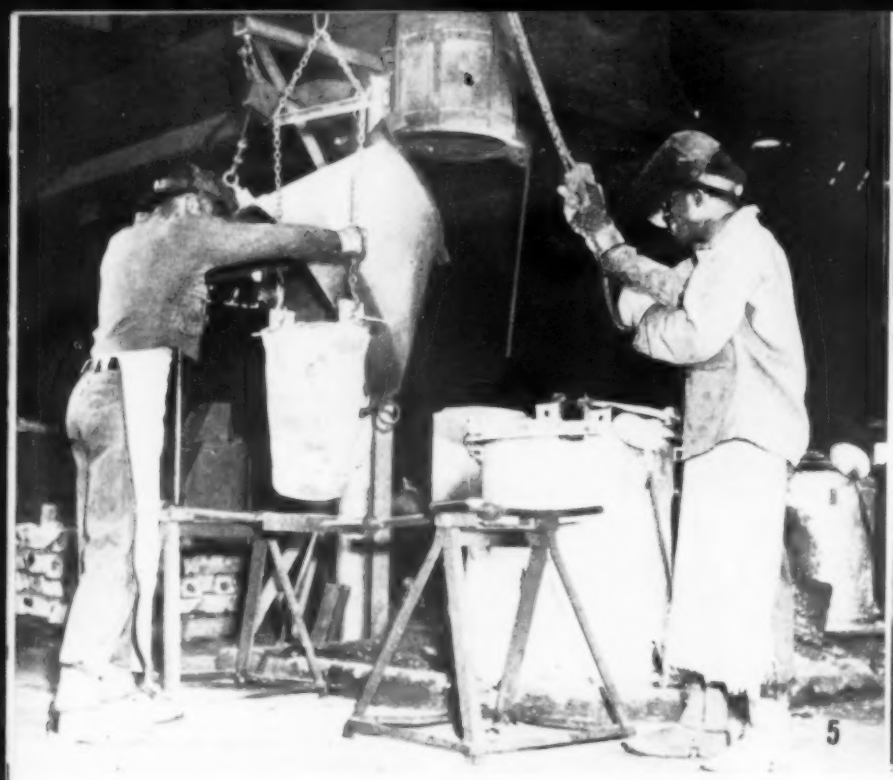
Melting furnaces, one of which is shown in Fig. 6, are oil fired. The 15 furnaces used for melting aluminum are of the tilting type, 400-lb capacity, and are equipped with thermostatic controls. Aluminum

Fig. 1—Portion of conveyor line on which small to medium size molds for aluminum castings are poured. Bull ladles on trolleys are employed for the larger castings produced on this line

Fig. 2—Row of squeezers on which molds for most of the smaller aluminum castings are produced. After assembly, molds are set on the pallet conveyor that moves them to the pouring area and to a shakeout

Fig. 3—Aluminum sprues, risers, runners and rejected castings are remelted in this reverberatory furnace and the metal is cast into ingots in conveyor molds

Fig. 4—Portion of the rollover line on which molds for large castings are produced. Completed cope and drag sections are transferred to roller conveyors and, after assembly, are spotted on the pouring line



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6

CLOSE TOLERANCES....

alloys are never heated above 1400° F. All are held at 1200 to 1250° F for a half-hour while nitrogen is bubbled through from a coated steel tube immersed at the center and reaching near the bottom of the pot, to remove hydrogen absorbed by the metal.

Before pouring, the temperature is raised to that specified for the castings to be produced and is held at this temperature, which is recorded with automatic equipment. Ladles are preheated and are kept well coated to avoid iron pickup. Metal used for small castings is dipped out in hand ladles, but all furnaces tilt for filling bull ladles carried on trolleys. Where unusually exacting temperature controls are necessary, portable pyrometers are used to check metal temperatures in ladles.

Melting practices for magnesium-base and copper-base alloy castings are fairly conventional. Magnesium alloys are superheated to 1700° F before steel crucibles are lifted from furnaces, Fig. 5, and are placed in stands to cool to 1550-1200° F before being poured.

All melting is done in furnaces located around the perimeter of the melting department area shown in Fig. 10. All aluminum furnaces are along two long sides, magnesium furnaces at one end and copper-base alloy furnace at the opposite end. A row of squeezers, Fig. 2, makes molds that are transferred to a continuous pallet conveyor loop, one side of which parallels the casting aisle, Fig. 1, served by one row of aluminum furnaces.

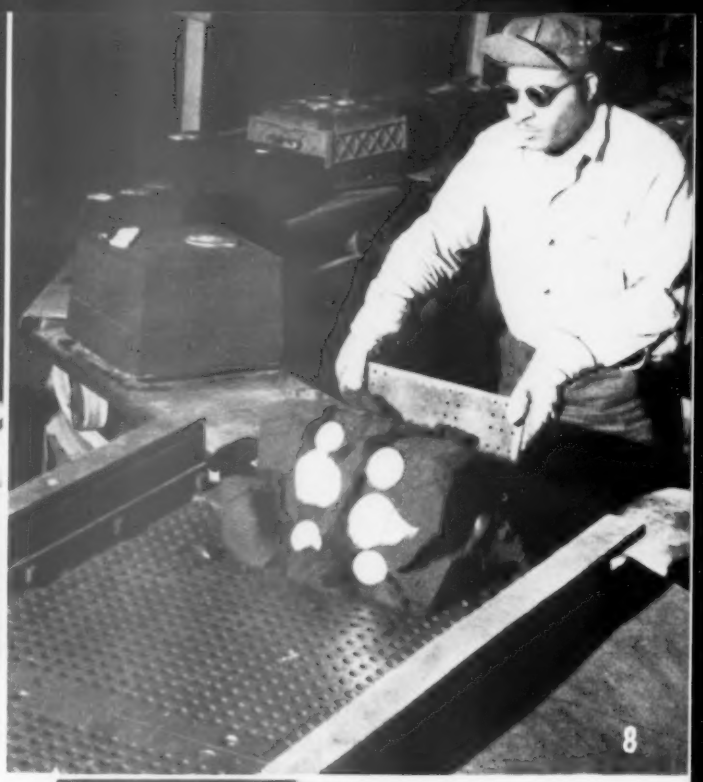
Large molds up to 50 x 52 in. are produced on roll-over machines, Fig. 4, along an aisle paralleling the second aluminum pouring line. Each of these machines is at the end of a short transverse roller conveyor along which copes and drags move to assembly points where they are lifted by trolley hoists, closed and spotted along the pouring line. Molds for alloys other than aluminum are made on machines near the ends of the melting area and are spotted on or near end aisles for pouring.

Two mold shakeouts are provided, one, Fig. 8, being near the end of the pallet conveyor loop to handle molds poured on this conveyor. The other shakeout, for large molds received from trolley hoists on a monorail, is at the end of the area where large molds are poured. Both shakeouts are open above and are served by exhaust blowers that pull air downward through the gratings and help to remove fines from the sand which falls on the belt conveyor of the receiving system. A third shakeout with exhaust openings at the side, is used for core molds.

As the degree of dimensional precision attained in sand castings is largely dependent upon the precision attainable in molds and cores, a great deal of attention is given to those factors which help to hold molds and cores to size and which insure proper location of cores in the mold. In making green sand molds, Fig. 4, sturdy metal flasks are used.

Vibrators are employed to withdraw patterns, Fig. 7, and core boxes are lifted slowly by pneumatic means both for convenience and to prevent damage to cores. Only skilled operators are employed and they are required to use all necessary care in mold making and handling. Molds are blown out carefully before assembly, and riser holes are closed with loose wads of tissue paper to prevent any sand or dirt dropping into the mold before it is poured.

Where cores must be located within unusually close limits, their position is checked with gages, as in Fig. 9. Filing of cores is not permitted. If cores do not fit properly, the reason has to be determined and a



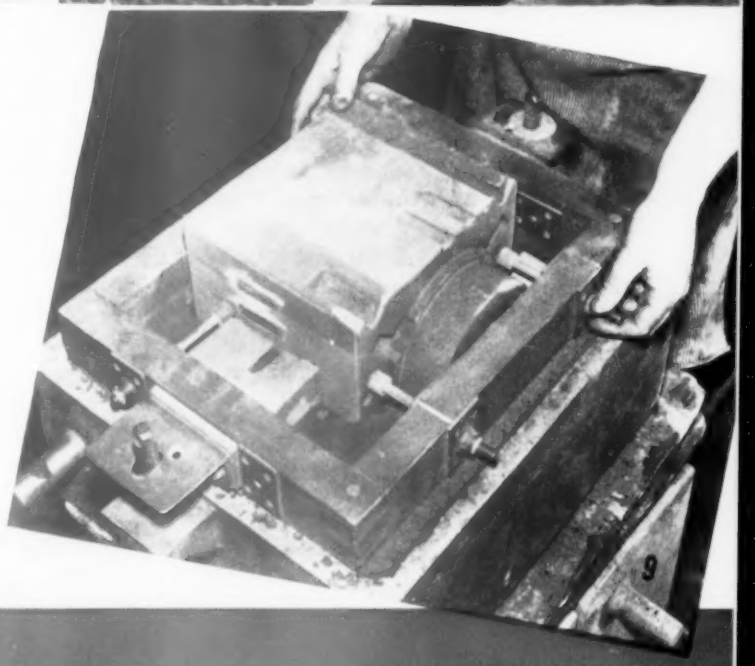


Fig. 5—Crucibles of magnesium at 1700° F are removed from melting furnaces, one of which is shown here, and are set in stands to cool to 1550-1200° F before pouring into molds

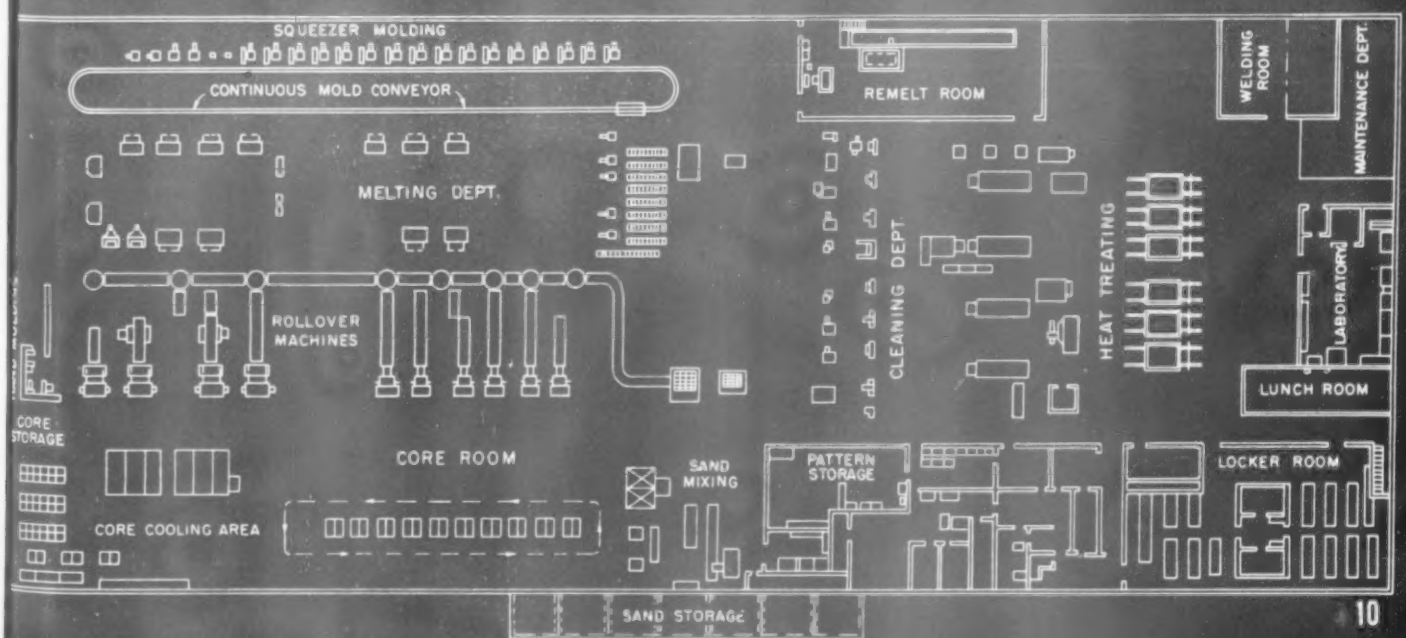
Fig. 6—One of the 15 furnaces used for melting aluminum. Nitrogen is bubbled through the melt for a half hour to remove hydrogen before the melt is raised to casting temperature

Fig. 7—Withdrawing a large core from a box on one of the large rockover machines. Cores are rested on drier plates to help avoid distortion

Fig. 8—This shakeout handles molds delivered by the conveyor in the background. Pallets on this conveyor traverse the row of squeezers (Fig. 2)

Fig. 9—Using a gaging frame to check the location of cores. This is one of many checks applied to hold dimensions within close limits

Fig. 10—Layout of the Sperry foundry showing location of various departments



remedy found before more molds are made, even if delays for making new cores are involved.

This foundry makes many exceedingly complex castings, one such being shown in Fig. 15. Many castings have walls of $\frac{1}{8}$-in. or occasionally even 3/32-in. thickness. Also produced are many simpler castings, including quantity items where matchplates are justified. The best coremaking practice is employed and, in many cases, precise core work makes possible the close dimensions held. An indication of what often is accomplished is one casting that has a 21-in. maximum dimension and requires 52 cores, but is held within $-1/32 +$ zero in. on its large dimension, *as cast*. It is not uncommon to hold 1/64-in. tolerance on as-cast dimensions up to 8 in., although wider limits are preferred, of course, since they tend to lower costs.

Naturally, it is possible to hold closer dimensions in core molds than in green sand molds, hence many core molds are employed. This and the need for precisely sized core in green sand molds, make it essential to employ careful coremaking practice, as well as well made patterns that are precise in dimensions.

Although metal patterns (*Please turn to page* 184)

CLOSE TOLERANCES....

Fig. 11—Part of the pattern shop where both wood and metal patterns are made, except for casting the metal

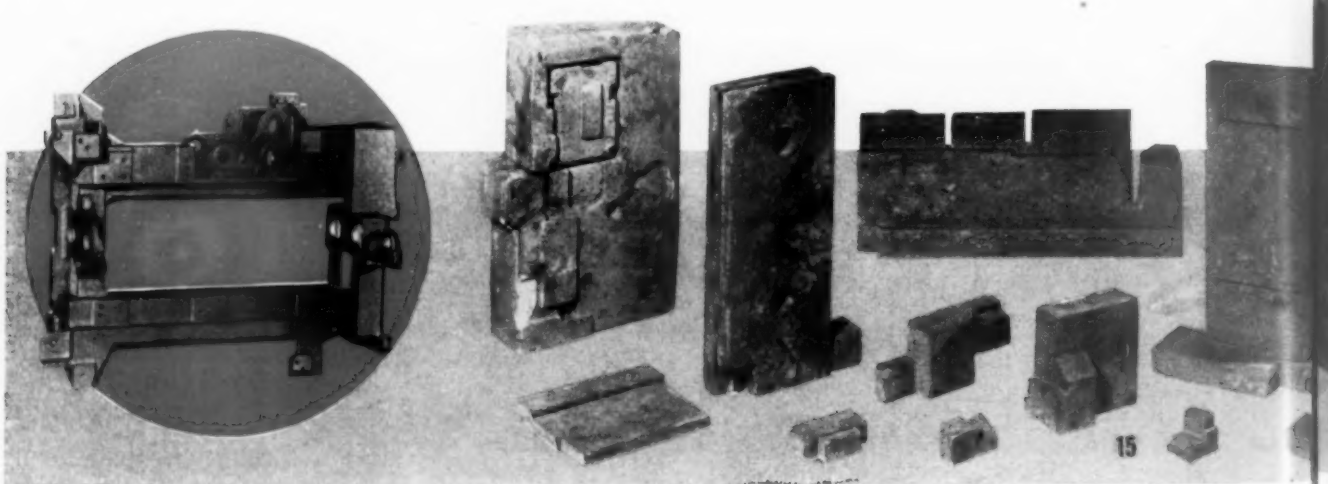
Fig. 12—Portion of the processing room in which patterns are checked, gates, sprues and risers are added, and patterns are mounted for machine molding

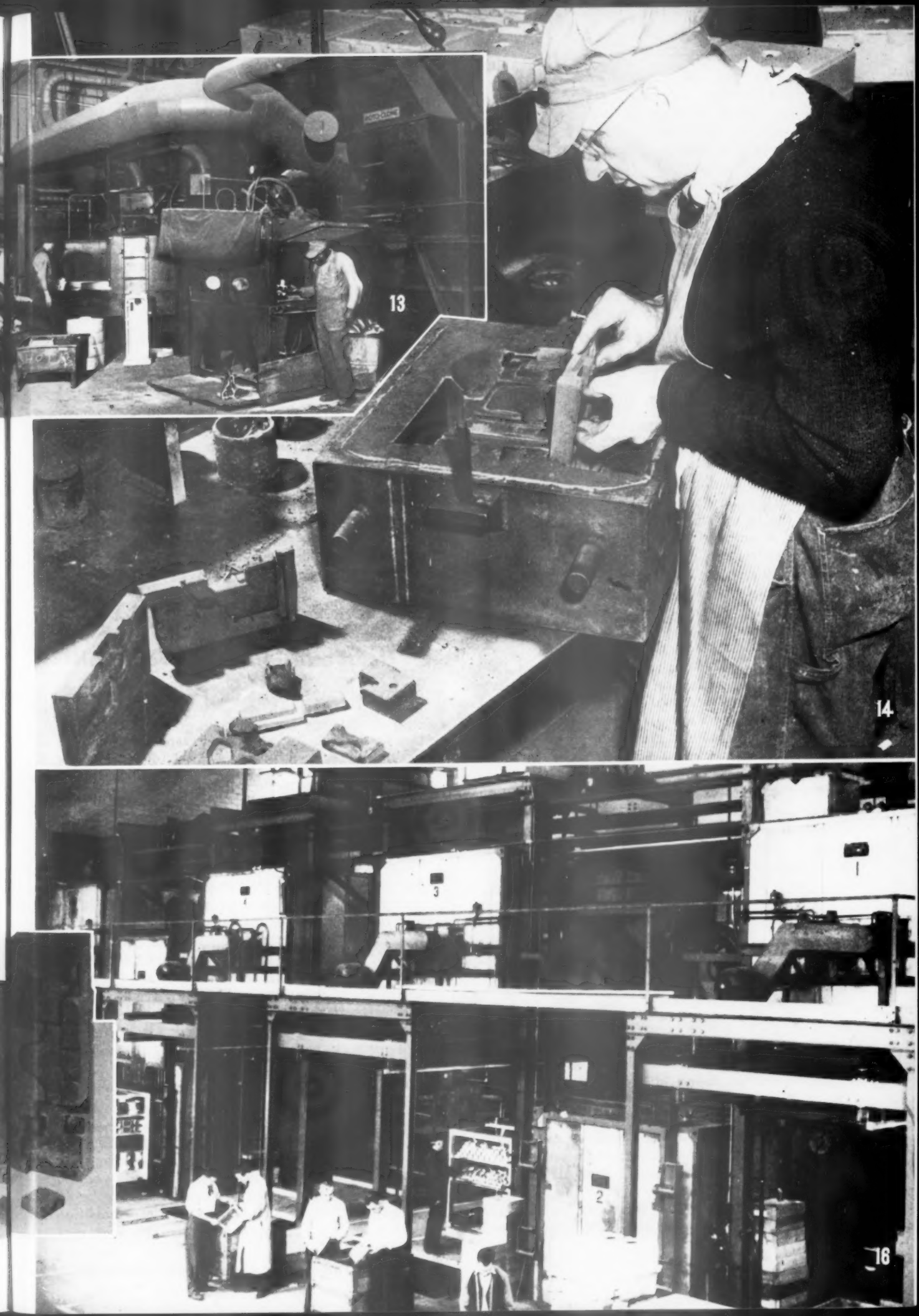
Fig. 13—Some of the equipment in which all castings are blasted after snagging and visual inspection

Fig. 14—Assembling of baked cores to produce core molds in which certain castings are made to close tolerances

Fig. 15—One of many complex aluminum castings produced in the foundry using core molds, one of which is shown assembled. Cores used in building the mold are also shown

Fig. 16—Part of the row of heat treating ovens through which nearly all aluminum and magnesium castings are passed before they reach final inspection

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Questions AND A

Casting of Diesel Crankshaft

Q.—We operate a small foundry, and find we have a broken shaft on our auxiliary diesel. It is 3 in. diam and 30 in. long, single throw. Could we make a replacement shaft of alloy iron, and what would be a suitable composition? Should it be poured in the horizontal or vertical position?

A.—If you have not had experience in casting crankshafts, we would not recommend trying to make the diesel shaft, even though it is a comparatively simple one. It can be cast in either the horizontal or vertical position. A suitable composition would contain 2.00 to 2.25 per cent silicon, 2.80 to 3.10 per cent total carbon, 0.10 per cent maximum sulphur, 0.20 per cent maximum phosphorus, 0.60 to 0.80 per cent manganese, 1.50 to 2.00 per cent nickel, 0.60 to 1.00 per cent molybdenum, 0.20 per cent maximum chromium, and 0.10 to 0.20 per cent copper.

With this mixture which will contain a considerable quantity of steel scrap to get the low total carbon, the gates and risers should be fairly heavy to insure adequate feeding. Vertical pouring requires special flask equipment which can be up-ended after molding, and in your case if you decided to try it, we suggest molding and pouring in the horizontal position. We believe the best procedure is to use a long branch runner gating into risers close to the casting at the ends, and at each of the cheeks of the throws. Use of insulating firebrick to form the risers will help in providing good feeding.

Will Melt Zinc-base Alloys

Q.—Can you suggest any furnace manufacturer which specializes in small melting units suitable for melting 200 to 300 lb of zinc alloy? Also do you have any information or literature relating to the permanent mold casting of zinc alloys?

A.—We believe that any of the nonferrous melting furnace manufacturers can supply you with a unit suitable for melting zinc-base alloys. Their names and addresses can be found in the advertising pages of THE FOUNDRY. Zinc-base alloys usually are melted in iron pots rather than in graphite crucibles, similar to the practice employed with aluminum alloys. Since zinc is about three times as heavy as aluminum, a pot which will hold 100 lb of aluminum will hold 300 lb zinc.

We do not know of any literature on the subject of permanent molding of zinc. It is our understanding that a large part of the work is done by the "slush-molding" process which involves the use of bronze molds. Molds are filled with the molten zinc and left for a few minutes until a skin or metal thickness of the desired depth forms. Then the remaining liquid metal is poured back into the melting furnace. Such objects as lamp pedestals or standards, hollow novelties, etc. are made that way. For solid objects, the zinc is allowed to freeze completely before removal.

Bronze molds for the process are made by the plaster molding procedure rather than by tooling from the solid. Mold may be in two or more pieces depending upon whether or not undercuts require additional parting or joint lines to permit removal of the casting.

Use Tellurium To Obtain Chill

Q.—We are still looking for a satisfactory method of obtaining chilled wheels with a minimum depth of chill of ¼-in. on the tread and good machining qualities in the hub for wheels between 12-in. diam at 25 lb, and 20-in. diam at 175 lb. The article on use of tellurium for promoting chill which appeared in the July issue leads us to believe we might be able to coat the chills or spray the molds with tellurium to obtain the desired results. The iron we use is a soft type for other castings and has the following composition: Si 2.2 per cent; TC 3.5 per cent; S 0.07 per cent; Mn 0.85 per cent, and P 0.16 per cent.

A.—It appears to us that there is no reason why you cannot produce the desired chill on the wheels you mention by use of tellurium, provided you are willing to do a little experimenting to determine the most suitable procedure. In this connection your attention is directed to the existence of several patents relating to use of tellurium as addition directly to the iron and in the form of a wash or coating applied to cores or molds. In the article you mention information is presented on both applications, and the results obtained.

For your work it seems that you might obtain better control by adding tellurium directly to the metal in the ladle rather than by applying a coating to the chill, but, as previously mentioned, experimentation will have to be made to determine the most suitable procedure for your conditions. As a start you might try the addition of 0.025 per cent tellurium or 11.25 grams per 100 lb metal (0.01 per cent addition is slightly over 4.5 grams), and then try more or less

ANSWERS

as the situation demands. In case you want to try the coating method, we understand that the tellurium pastes available contain about 30 per cent of that element, and a coating about 1/64-in. thick on the chill might give the desired results.

Tellurium boils at slightly over 2500°F, hence the addition to molten metal should be made not too long before pouring, or its effect will be lost. In the case of coatings, the iron should be poured hot to obtain the greatest benefit. Since tellurium boils at the temperature indicated, there appears no need to worry about later contamination as the high temperature attained in the cupola during melting will eliminate it.

Silica Sand as Cupola Lining

Q.—Up to the present our cupola has been lined with firebrick in the usual manner. We have been given to understand that the bricks may be omitted, and that the lining may be composed of silica sand from a large available deposit on our property. We shall appreciate information on how this material is prepared and applied.

A.—In the usual method of lining a cupola and keeping the lining repaired, the sand, in the condition known as "mud," is daubed over the burned area in the brick lining, and must be renewed each day. Usually it is not sufficient protection. Some of the brick work also disappears. The amount depends on many factors, including time, temperature, method of lighting and charging, amount and character of fluxing material incorporated in the charges. For an ordinary heat of 2 or 3 hours, a mud daubing approximately 1 in. thick will preserve the bricks. For longer heats it is necessary to bed split bricks in the mud.

According to J. E. Hurst in his book *Melting Iron in The Cupola*, plastic material should be highly refractory. Ganister, or a fire clay and sand mixture with sufficient water added to convert the mixture to a plastic mass, commonly is used for cupola lining purpose. Any plastic material used should be highly refractory, and at the same time sufficiently plastic to adhere to the brick, or any other type of lining, and form a hard lining of substantial mechanical strength after firing. The author prefers to use daubing material in the dryest possible state, without loss of plasticity. This material may be spread or forced on by hand, or rammed or tamped with a wooden rammer.

Where material of this kind is employed to form a monolithic lining, no bricks are needed. A wood or steel form the proper diameter is placed upright on the sand bed. The plastic material is rammed around the block. A number of ½-in. steel rods reinforce the lining material and hold it in place. A toe on the rod at each end is welded to the furnace shell. Monolithic linings usually include silica ganister and fire clay. A number of proprietary ramming mixtures also are available. A mixture designed specifically for side-blow converters includes: Silica ganister minus ⅜-in. mesh, 50 per cent; silica ganister minus ⅛-in., 30 per cent; silica flour, 140 mesh or finer, 14 per cent; western bentonite 6 per cent; water by weight 7 per cent.

Low Melting Alloy for Cores

Q.—Will you please send us any information you may have on fusible alloys for making cores? We understand that some foundries are using low-temperature alloys for cores where very intricate shapes are involved.

A.—While there are a number of low melting point or fusible alloys containing from 50 to 60 per cent bismuth in combination with tin, lead and cadmium, with melting point ranging from 158 to 291°F, we do not know of any that are being employed as cores. We doubt that such alloys could be used for that purpose since they would begin to melt as soon as touched by the molten metal unless possibly they were subjected to extremely low temperature previous to pouring of the molten metal. Under such condition probably sufficient heat would be abstracted

GANGWAY!

By J. A. PATTERSON

"That big ugly phony!! That handsome face is painted on his shield!!"

Questions AND ANSWERS

from the poured metal to cause it to form a solid skin at the points or areas of contact.

We wonder if your reference to fusible alloys applied to cores means the use of lead in fastening complicated cores together instead of using bolts. In that method suitable connecting holes are provided in the core sections, and after assembly, molten lead is poured in. When the lead solidifies the core sections are fastened together so tightly that they cannot be separated without destruction.

Baked Cores Stick to Driers

Q.—We have started to make small burners for gas hot plates but have run into some difficulty in that the thin core sections are sticking to the driers after baking. There are six long fingers on each burner core about ⅜-in. diam, and they break off the main body. We are using a crushed and washed silica sand with a linseed oil-base core binder. Is there some way of coating the core driers, or is there something we can put in the sand to prevent this trouble?

A.—We suspect that your experience of cores sticking in the driers is probably due to use of excess binder, although it might be that there is not sufficient dimensional clearance—that is, the driers make a tight fit. The reason we lean toward the excess binder theory is that the long thin fingers of the core tend to be fragile, and this leads to use of lower sand-to-oil ratios in order to "stiffen' them. Undoubtedly, when starting the job a few fingers broke off, and more oil was added to make them stronger, resulting in an increase rather than a decrease in the trouble.

You do not mention what ratio of sand to oil binder you are using, but we believe that it should be not less than 40 to 1, and preferably 60 to 1 if it does not result in handling breakage. Possibly the driers from previous use contain scale and a gummy deposit, and those should be removed by abrasive blasting. If the driers are made of cast iron the gummy residue can be removed in a hot, strong solution of lye. However, do not try that with aluminum alloys as they are strongly attacked. A number of alkaline cleaners are available for aluminum.

Permanent Molding of Bronze

Q.—We contemplate the production of brass and bronze castings using permanent or metal molds instead of sand. Is there a book giving the essential details on mold making, etc.?

A.—So far as we know there is no book on permanent mold technique for brasses or bronzes, or for that matter, on the process as applied to other metals and alloys. It appears that there are two avenues open to you if you desire to enter that field. One is to experiment in building molds, and the other is to have your molds designed and constructed by some firm with the requisite experience in their manufacture.

Generally speaking the same basic foundry principles are employed in permanent mold and sand casting. In other words, the alloy has to be fed into the mold with the least disturbance, and the mold arranged so that the casting begins to freeze at those points farthest from the gate with freezing progressing to the gate. Adequate risering also is essential.

Plans Making of Nodular Iron

Q.—In our foundry located in Cuba, we would like to carry on some experimental work on nodular cast iron. However, we require some copper-magnesium containing about 20 to 30 per cent Mg, and would like to know how it can be made. Since Mg is easily oxidized it appears that some precaution should be taken in adding it to liquid copper. We will appreciate complete information relative to temperature, flux, type of melting furnace, etc.

A.—Since copper-magnesium alloys of the desired composition are available on the market, it seems hardly worth the time and effort to make them in your own foundry even though it apparently is not too difficult to produce. Years ago magnesium-copper or copper-magnesium was produced in two ways. One was to melt the copper under a cover of magnesia (magnesium oxide), throwing the magnesium on the metal surface after clearing a bare spot, and stirring it in with a *dry* graphite stirring rod. The other method was to introduce the magnesium underneath the surface by use of a graphite "phosphorizer." That, of course, was where no iron was desired in the final alloy. In your case where that is of no importance, an iron rod to which the magnesium can be wired or fastened should work satisfactorily.

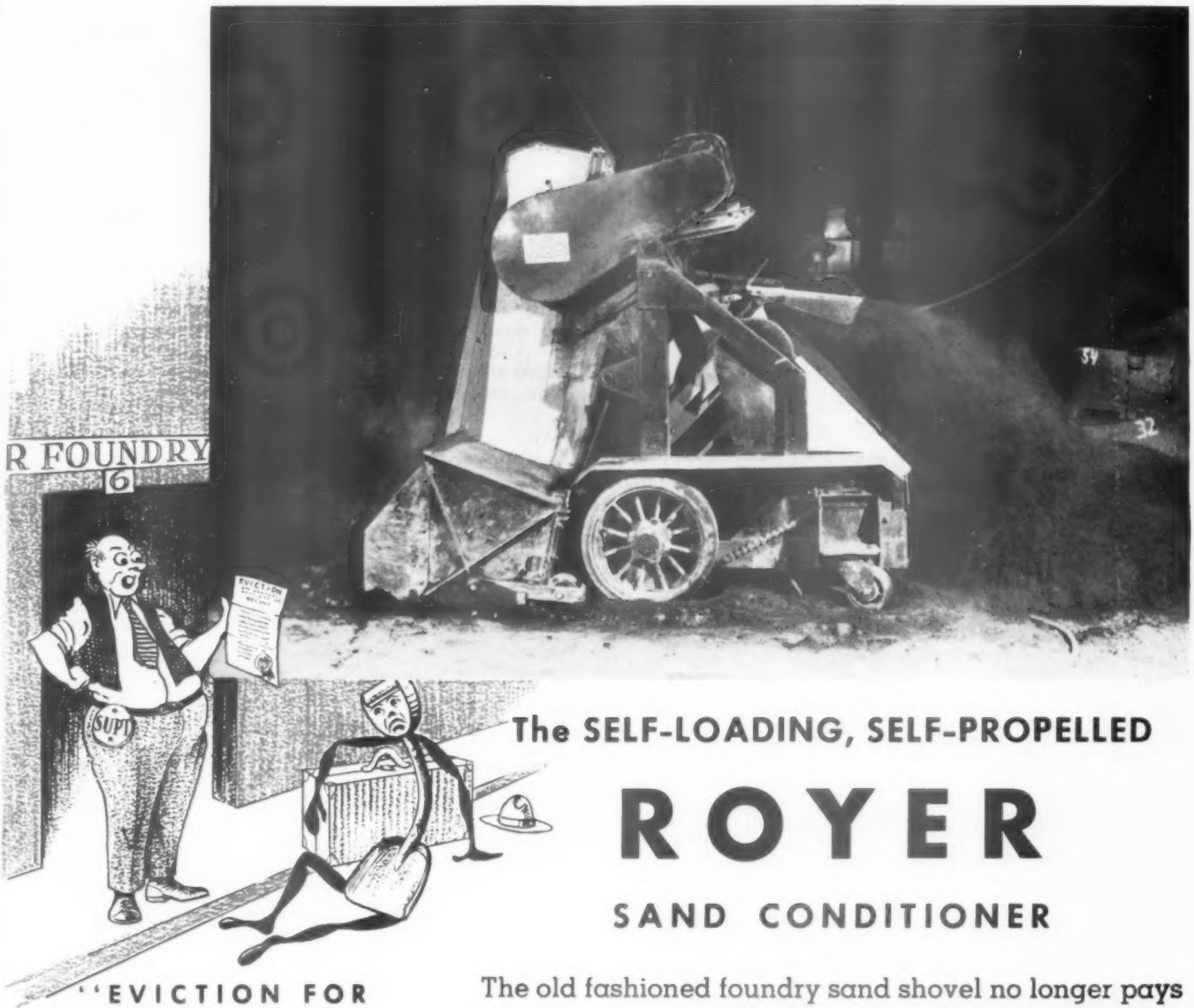
We do not believe that it will be advisable to add all the magnesium at once, but rather a small amount at a time. Since magnesium volatilizes to slightly over 2000°F, it also is advisable to hold the copper at the point where it is just molten, as addition of magnesium probably will increase the temperature through exothermic reaction if oxides of copper are present.

Use Ganister To Line Furnace

Q.—As old and long time readers of THE FOUNDRY we shall appreciate any information you can give us about the way silica sand can be rammed in a Bracklesburg rotary furnace for melting gray iron. In this country we have been using firebrick, but we understand that silica sand can be used for the same purpose. What other material is used to hold the sand together during and after the lining operation? What mesh of sand is used? We want to know how to dry a lining of this kind before the furnace starts melting.

A.—Bracklesburg and Sesci furnaces in Europe quite frequently are lined with a rammed ganister monolithic lining. We do not know of any rotary furnaces in this country where this practice is followed. Straight and arch silica brick are used. The furnace is lined in a horizontal position. With a rammed lining it is necessary to stand the furnace on end and use a form or core in the center. The form is in sec-

(*Concluded on page* 100)



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Questions AND ANSWERS

(*Concluded from page* 98)

tions with one or two wedge-shaped key pieces to permit removal after the job is done.

Usually monolithic linings are made with silica ganister, ¼-in. mesh down, mixed with fire clay or other bonding refractory material. Molasses water is used for tempering. The mixture should be prepared in a muller.

An excellent formula developed at Armour Research Foundation, Chicago, is designed specifically for side blow converters: Silica ganister minus ⅜-in., 50 per cent; silica ganister, minus ⅛-in., 30 per cent; silica flour, 140 mesh or finer, 14 per cent; western bentonite 6 per cent; water, by weight, 7 per cent. Use as much water as possible without puffing while ramming. Mull 8 minutes or more. Ram as hard as possible around steel form. Dry slowly at 600°F as long as practical. Up to 36 hours is desirable. Heat slowly from 600°F to 1250°F in 3 to 4 hours. Preheat from 1250°F to 2000°F before charging with molten iron. Particle size distribution of dry mixture should be as follows: On 28 mesh, 53 to 55 per cent; through 28 and on 65 mesh, 12 to 14½ per cent; through 65 mesh, 33 to 36½ per cent.

Volume Shrinkage of Alloys

Q.—Could you give us a formula for calculating the volume expansion coefficient of manganese bronze over the range from room temperature to about 2000° F? We are faced with the problem of figuring the furnace and ladle capacities for a heat of manganese bronze (57 to 58 per cent Cu), and we find that tables of coefficients of expansion only range as high as 400° F.

A.—The only information we have been able to locate on total volume shrinkage or contraction is that presented by Pilling and Kihlgren in *Transactions* of the American Foundrymen's Society, Vol. 40, 1932 in a paper entitled "A Method for Study of Shrinkage and Its Distribution in Castings." In this work the authors made a 3-in. diam cylinder, 3 in. long which was molded on the side and poured through a bottom gate. Volume of the mold was measured; density of the sound alloy was obtained as well as its linear shrinkage, and the weight of the unfed casting or cylinder.

From that information (the metal being cooled to the freezing point and quickly cast into the mold) it was found that manganese bronze containing 56.75 per cent Cu, 40 per cent Zn, 1.25 per cent Fe, 0.50 per cent Sn, 1.0 per cent Al, and 0.50 per cent Mn had a total volumetric shrinkage of 11.5 per cent; a freezing shrinkage of 4.6 per cent, and a linear shrinkage of 2.32 per cent. Other alloys investigated in a similar manner included aluminum bronze (90-10) which had a total volume shrinkage of 11.2 per cent, a freezing shrinkage of 4.1 per cent, and a linear shrinkage of 2.37 per cent, red brass (85-5-5-5) had a total volume shrinkage of 10.6 per cent, a freezing shrinkage of 6.3 per cent, and a linear shrinkage of 1.44 per cent. Yellow brass (70 Cu, 27 Zn, 2 Pb, 1 Sn had a total volume shrinkage of 12.4 per cent, a freezing shrinkage of 6.4 per cent and a linear shrinkage of 1.98 per cent.

Has Difficulty With Pin Holes

Q.—For several months we have been experiencing trouble with our high alloy (Ni-Cr) cast irons, especially where the total of the two alloys runs about 5 per cent. Difficulty is pin holes such as are typical of a material that has been gassed or oxidized. These small round holes extend perhaps as much as ⅜-in. underneath the surface, and are found mostly in the cope but often are found in the drag. We have made sample castings where sand control could be watched closely and checked as to moisture, and hardness without improvement. We have also done the same with core set up. Cupola appears to be operating very satisfactorily giving clean hot iron, at a rate which is average for its size.

A.—From your description of the nature of the holes in the castings, we gather that they are from an external source since you state that they extend ⅜-in. beneath the surface, and additionally that they are discolored. If that is the case, then the holes result from steam or gas generated in the mold material. While you mention making castings where moisture and mold hardness could be checked, you did not say whether you had tried varying those properties—that is using less moisture and lower mold hardness—and observing the effects.

However, if the holes tend to be pear-shape and located just under the skin without any connection to the exterior surface, they are due to absorbed gas. One possible source of such gas is the use of ladles which are not thoroughly dried. Linings should be raised to almost a white heat to insure removal of the last vestiges of moisture. You might be operating the cupola with a bed that is below the proper height. Another possibility is the inclusion of tramp aluminum or other nonferrous materials in the scrap charges.

Straightening Warped Pattern

Q.—How can we straighten a 20 x 30-in. matchplate? The plate has a flat pattern on it, is ⅜-in. thick, and warped due to improper gating when made (flask was too small and normal gating and risering was not adhered to).

A.—If the matchplate is an aluminum alloy, it possibly might be brought back to the desired straightness by use of a screw press and roller supports. The matchplate is supported on the rollers placed on opposite sides of the warped section with the screw of the press located midway between the two. Screw is then lowered until the plate is sprung about half the amount of the warpage in the opposite direction. You may have to make a number of tries before the plate is straight. If the plate is made of cast iron you will have to do the springing in easy stages or steps with the application of heat (probably up to a red heat) and allow the plate to cool under the press.

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Men OF INDUSTRY

THOMAS F. DORSEY has been elected president of the Pittsburgh Steel Foundry Corp., Glassport, Pa. Mr. Dorsey has been general manager of Fort Pitt Steel Casting Division, McKeesport, Pa., since it was acquired by the corporation in 1945, and vice president since 1947. In December, 1948 he assumed the additional duties of general manager of the corporation's Glassport, Pa., foundry. He will continue to act as general manager at both plants. Mr. Dorsey is an active member and past director of the Steel Founders' Society of America, a director of the Pittsburgh Foundrymen's Association and a member of the AFS.

♦ ♦ ♦

William E. Mahin has been appointed director of research, Armour Research Foundation of Illinois Institute of Technology, succeeding **Dr. Martin H. Heeren,** who has been named director of applied research with the sapphire division, Elgin National Watch Co., Aurora, Ill. Mr. Mahin, a graduate of Notre Dame University, received his master of science degree from Carnegie Institute of Technology. He was associated with Westinghouse Electric Corp., East Pittsburgh, Pa., and Vanadium Corp. of America, Bridgeville, Pa., prior to joining Armour Research Foundation in 1946, as chairman of metals and minerals research. He is a member of various technical committees of American Foundrymen's Society, vice chairman of the Chicago Section, American Society for Metals, and program chairman of the Chicago Section, American Institute of Mining and Metallurgical Engineers.

♦ ♦ ♦

Joseph J. Clark has been appointed chief metallurgist and director of spheroidal iron research and development, Benton Harbor Malleable Industries Inc., Benton Harbor, Mich. Following graduation from Michigan State College Mr. Clark was associated with General Motors Corp.'s Saginaw Malleable Iron Division, working in the metallurgical laboratory and later on the plant engineering staff. From 1937 to 1947 he was assistant chief metallurgist there, and when the division converted a portion of the plant to production of alloy steel castings during the war, he was appointed steel metallurgist. For the last year and a half he has been associated with Kaiser-Frazer Corp., Willow Run, Mich., and Detroit, as foundry metallurgist and plant metallurgist for the K-F Engine Division. Mr. Clark has been active in metallurgical and foundry groups, and is a charter member and past director of the Saginaw Valley Chapter of the American Foundrymen's Society.

William S. Lowe, since 1944 associated with the Reeves-Ely Laboratories Inc., New York, has been elected executive vice president, A. P. Green Fire Brick Co., Mexico, Mo. A native of Kansas, Mr. Lowe was graduated from South Dakota State College with a degree in electrical engineering. He spent a number of years with General Electric Co., Bridgeport, Conn., where he became division superintendent, and two years during the war as an executive of SKF Industries Inc., Philadelphia. During his connection with Reeves-Ely Laboratories he served as chairman of the board of directors and president, Winsted Hardware Mfg. Co., Winsted, Conn.; chairman of the executive committee, director and treasurer, American Transformer Co., Newark, N. J.; and vice president, Waring Products Corp., New York.

♦ ♦ ♦

Wilbur Gwin, part owner of Gwin Bros. Pattern Shop, Terre Haute, Ind., has been appointed pattern shop superintendent, Terre Haute Malleable & Mfg. Co., Terre Haute, succeeding **Michael Kasarko,** who has resigned to open his own pattern shop there at 1201 Sixth Ave.

♦ ♦ ♦

D. L. Newton has been appointed chief industrial engineer, Cleveland Works, Aluminum Co. of America, succeeding **S. H. Bennett,** who has been named manager of the Buffalo Works, American Magnesium Corp., Cleveland, subsidiary of the Aluminum company. Mr. Newton, a graduate of University of Wisconsin, joined the time study department of the Detroit Works in 1940. He went to Cleveland in 1945 as chief industrial engineer of the forge shop and last year assumed the same duties in the permanent mold foundry. **D. C. Mathewson** succeeds Mr. Newton in

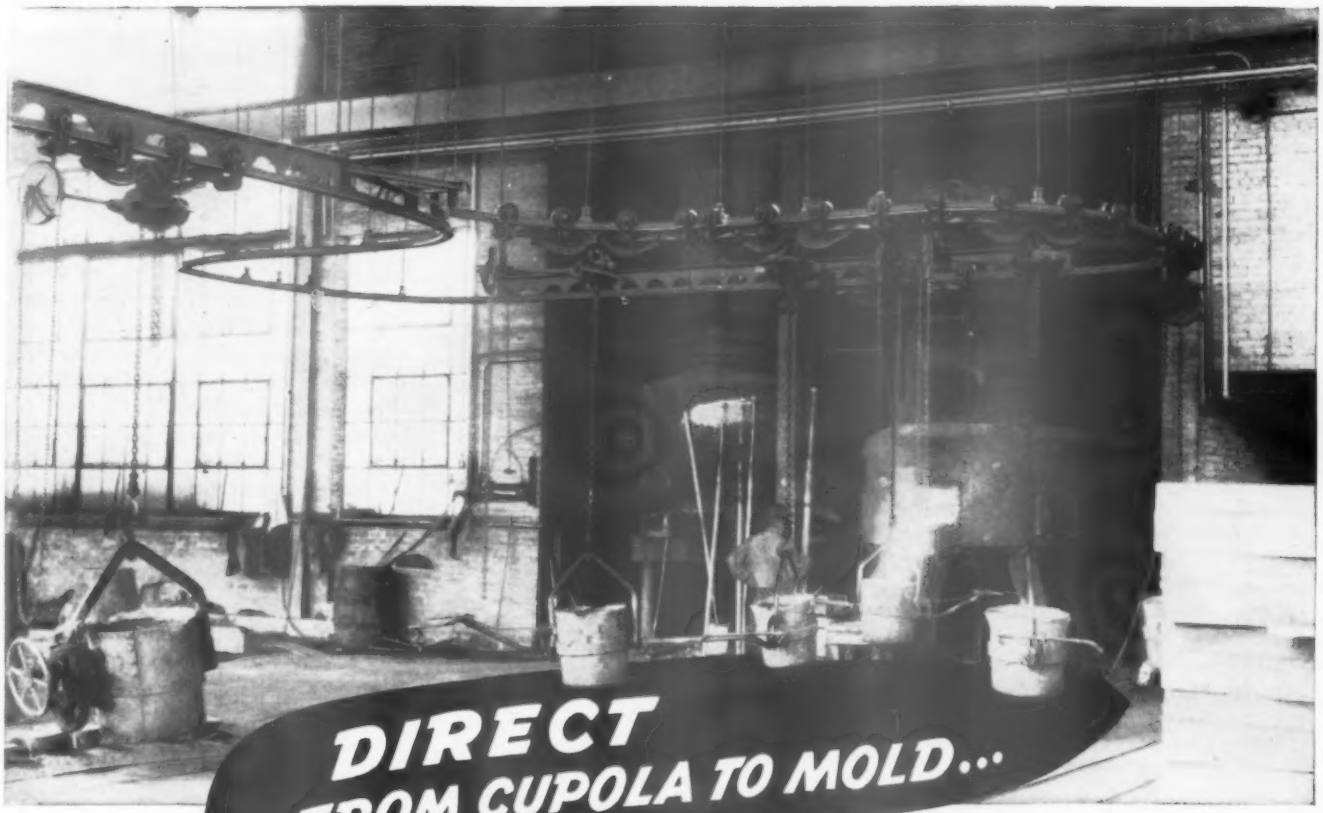
(*Continued on page* 104)

THOMAS F. DORSEY

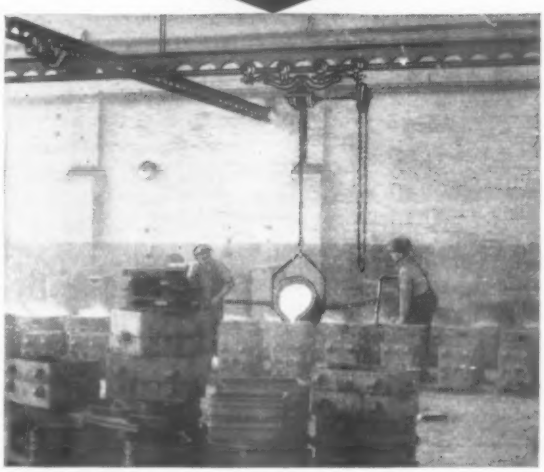
WILLIAM E. MAHIN

JOSEPH J. CLARK

WILLIAM S. LOWE



DIRECT FROM CUPOLA TO MOLD...



EASY . . . SAFE . . . No Rehandling!

Foundries from the largest to the smallest are profiting from installations of Cleveland Tramrail overhead materials handling equipment. Output per man is stepped up, safety promoted and costs cut.

Because floor obstructions do not hinder the operation of Cleveland Tramrail, hot metal can be taken directly from cupola to mold without rehandling. As a result travel time is reduced and heat loss of metal is held at a minimum.

The overhead equipment is also advantageous in the handling of molds, transporting finished castings and scrap, charging cupolas, etc.

Most installations of Cleveland Tramrail pay for themselves within 12 to 18 months; some within 6 months. Thereafter they provide goodly dividends year after year.

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THE CLEVELAND CRANE & ENGINEERING CO.
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CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

Men OF INDUSTRY

(*Continued from page* 102)

the permanent mold foundry. **J. Howard Dunn** has been named assistant manager of the Cleveland branch of the company's development division. Mr. Dunn was graduated from Iowa State College and joined the company as a development engineer in 1934.

♦ ♦ ♦

William Morley, recently elected chairman of the Philadelphia Chapter of the American Foundrymen's Society for the year 1949-50, is superintendent in charge of operations, Olney Foundry Division, Link-Belt Co., Philadelphia. Mr. Morley received his early education in Philadelphia public schools and was graduated from Williamson Trade school as a journeyman patternmaker. Supplementary training in metallurgy and business administration was received at Armour Institute and Northwestern University. In 1929 he joined the Chicago plant of Link-Belt Co. as a patternmaker, where he successively served in the foundry as an apprentice, as iron molding floor foreman, in the iron and steel cleaning departments and as assistant superintendent of the iron and steel foundry. In 1944 he was transferred to the Olney Foundry Division, as superintendent in charge of operations. Mr. Morley was vice chairman of the Philadelphia Chapter last year.

♦ ♦ ♦

Harry A. Cooper, president, the Cooper Alloy Foundry Co., Hillside, N. J., was elected president of the Alloy Casting Institute, New York, at its recent annual meeting held in Colorado Springs, Colo. Other officers elected at the meeting were: **R. W. deWeese,** Electric Steel Foundry Co., Portland, Oreg., vice presiednt; and **E. A. Schoefer,** executive secretary and treasurer. **B. J. Gross,** president, the Key Co., East St. Louis, Ill., and **M. G. Moore Jr.,** president, Empire Steel Castings Inc., Reading, Pa., were elected directors for three-year terms.

♦ ♦ ♦

Harry M. Laws has been appointed general manager, Lake City Malleable Inc., Ashtabula, O., subsidiary of Lake City Malleable Co., Cleveland. Mr. Laws received his early training in the malleable foundry industry at the Wilmington Malleable Iron Co., Wilmington, Del., which later became Eastern Malleable Iron Co. In 1929 he was named general superintendent of the Eastern Malleable Iron Co. plant in Bridgeport, Conn. When this plant was closed in 1935, Mr. Laws became vice president in charge of sales and production, New Haven Malleable Iron Co., New Haven, Conn., and more recently has been vice president and general manager, New England Malleable Iron Co., Warwick, R. I. He has been active in the Malleable Founders' Society for many years, and has just completed a three year term as a director of that organization. During the war he was a member of the Malleable Industry Advisory Committee of the OPA, Washington, and is still a member of the Malleable Subcommittee of the National Munitions Board.

♦ ♦ ♦

Leonard G. Daniels has joined Precision Metalsmiths Inc., Cleveland, as metallurgist in charge of its newly created engineering design department. Mr. Daniels entered Case Institute of Technology, Cleveland, in 1940, joining the Army two years later. During military service he studied at Muskingum College, and while in the European Theater was a student in the chemistry department at University of Munich. He re-entered Case Institute in 1946 and worked part time at Cleveland Graphite Bronze Co. and Republic Steel Corp., Cleveland, until his graduation in June of this year.

♦ ♦ ♦

Gilbert W. Chapman has been elected president, the Yale & Towne Mfg. Co., New York, succeeding **Calvert Carey,** who has resigned due to ill health. Mr. Chapman was president of the American Water Works Co. Inc., New York, prior to joining Yale & Towne Mfg. Co. last year as vice president. **Fred Dunning** continues as executive vice president and **Otto G. Schwenk** as vice president in charge of production of the company.

♦ ♦ ♦

William W. Moore has been named manager of the newly converted Toledo, O., district office, Allis-Chalmers, Milwaukee. Mr. Moore was graduated from Georgia Institute of Technology and joined Allis-Chalmers in 1919. He served as branch manager in the Charlotte, N. C., branch and since 1945 has been a sales representative in the Detroit district office.

♦ ♦ ♦

Harold B. Staniar, until recently manager of the Lackawanna Warehouse Co. Inc., Jersey City, N. J., has joined J. M. Barclay Inc., Newark, N. J., which is sales representative for the Automatic Transportation Co., Chicago. Mr. Staniar will handle sale of the latter's electric industrial trucks and motorized hand trucks in Union county, N. J.

♦ ♦ ♦

Frank Ross has been appointed assistant to the vice president in charge of sales, E. F. Houghton & Co., Philadelphia. Mr. Ross, who was ap-

(*Continued on page* 108)

WILLIAM MORLEY

HARRY A. COOPER

HARRY M. LAWS

LEONARD G. DANIELS

How to put new life into old sand

Here's an amazingly effective way to reclaim sand in your foundry.

Use a Robins Gyrex Screen for your sand recovery operation. It puts new life into old sand . . . *fast!*

This high-speed, large-capacity vibrator screens out lumps, reinforcements, chips, and other unwanted substances. The sand is revived, emerges clean, drops into storage bins, and is again ready for use.

What's more, you get sand that is *always uniformly graded to your exact specifications.* That means you save time. It means you save money, too!

The Robins Gyrex Screen is ideal for your job for three big reasons:

It's flexible. Its slope is adjustable from horizontal to 28° to suit changing load requirements.

It's powerful. Its positive eccentric vibrating shaft and anvil-type base frame are built to take overloads.

It's durable. Its screening surface is rubber-mounted and held drum-tight under spring tension to prevent the constant flexing that leads to crystallization.

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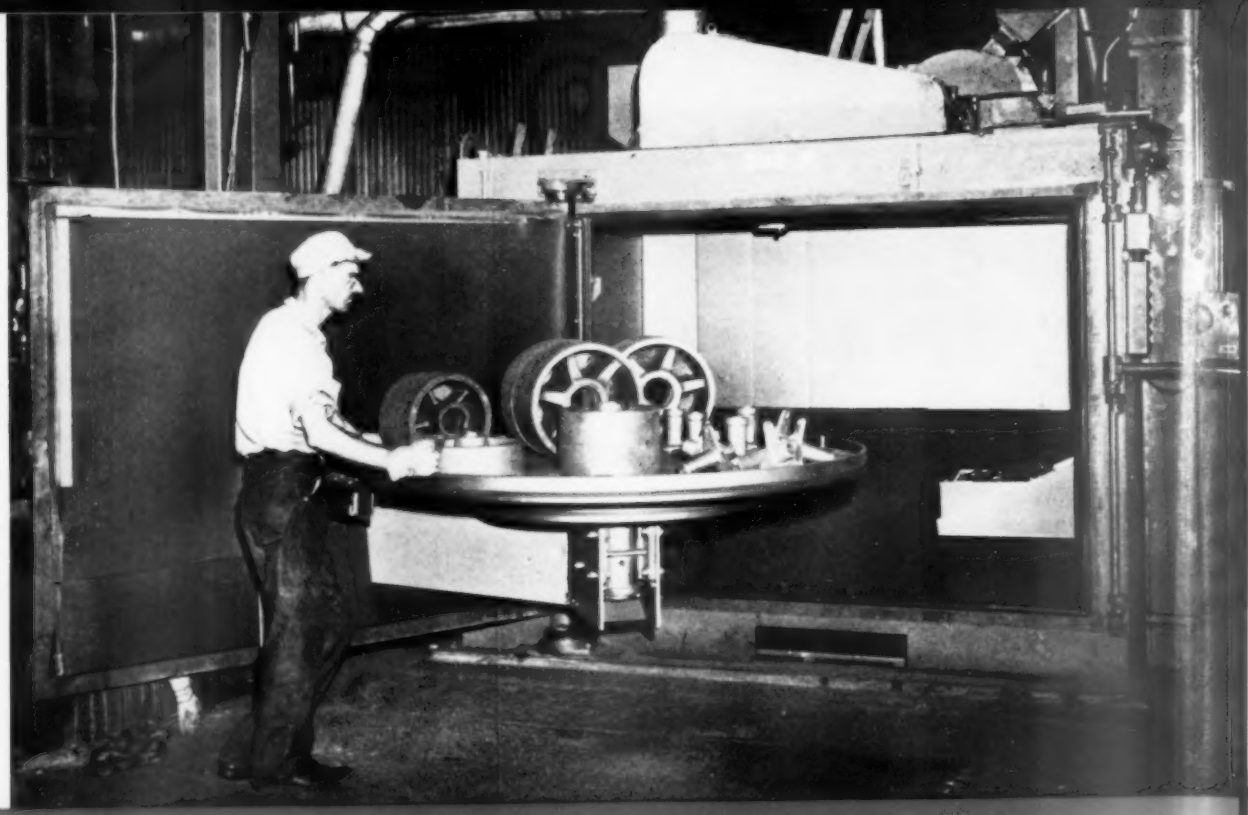

Six solid cast wheels, weighing up to 450 lbs. each, are cleaned on this Wheelabrator Swing Table in six minutes.

WHEELABRATOR® saves $4,275a

66" SWING TABLE

for the GENEVA METAL WHEEL CO.

The Wheelabrator Swing Table cleans three 48" diameter, spoked wheels in 3 minutes at the Geneva Metal Wheel Company.

How the WHEELABRATOR Cut Costs for the

GENEVA METAL WHEEL CO. GENEVA, OHIO

	FORMER METHOD	WHEELABRATOR METHOD	SAVINGS
MACHINE	3 Tumbling Mills Airblast Room	66" Wheelabrator Swing Table	SAVINGS per DAY
PRODUCTION	4 ½ tons a day	4 ½ tons a day	4 ½ ton $ 17.10
LABOR REQUIREMENTS	3 men - 16 man hours	1 man - 5 hours	SAVINGS per YEAR
COST PER TON	$6.17	$2.37	250 days $4,275

75a YEAR

Co. Geneva, Ohio

THERE'S no better way to cut cleaning costs than to install a Wheelabrator. The thorough, high-speed cleaning of the Wheelabrator is in sharp contrast to the slow, laborious hand blasting and tumbling operations found in many plants.

ELIMINATES NEED FOR AIRBLAST ROOM

A 66" Wheelabrator Swing Table replaced an airblast room and 3 tumbling mills at the Geneva Metal Wheel Co. and reduced costs $3.80 per ton. The direct savings returned their entire investment within two years. The Wheelabrator now cleans intricate castings in one pass that had to be tumbled and then hand blasted by former methods.

The Geneva Metal Wheel Co. casts grey iron hubs onto steel-spoked, steel-tired wheels. These wheels weigh up to 125 pounds, have a hub thickness up to 10" and a diameter up to 48". The foundry also produces cast hubs and solid cast wheels, weighing up to 450 pounds. The Wheelabrator Swing Table cleans three spoke wheels in three minutes, or six of the solid castings in six minutes—to SAVE TWO MINUTES CLEANING TIME ON EACH CASTING.

The chart above shows how the Wheelabrator effected these savings. It is typical of the cost comparisons in many plants throughout the country ranging from the smallest to the largest.

You too, can bring your cleaning costs down to competitive levels . . . by installing a *WHEELABRATOR*

New informative book gives complete, concise information on all phases of airless blast cleaning. Write today for Catalog No. 74-A.

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505 S. Byrkit St., Mishawaka 2, Indiana

WORLD'S LARGEST BUILDERS OF AIRLESS BLAST EQUIPMENT

Men OF INDUSTRY

(*Continued from page* 104)

pointed national manager of lubrication in 1944, will retain that position, transferring his headquarters from the Cleveland office to the home office in Philadelphia. He was associated with the Lubri-Zol Sales Co., Cleveland, when Houghton & Co. took over that organization's industrial lubricants division in 1942.

♦ ♦ ♦

Ray H. Moore has joined the staff of Claude B. Schneible Co., Detroit, as a special consultant. Mr. Moore has been engaged in materials handling and foundry equipment sales work since 1916. He has been associated with National Engineering Co., Chicago, for over 15 years, the last 5 years as district manager of its Cleveland office. Prior to that he was connected with W. W. Sly Mfg. Co., Cleveland, American Wheelabrator & Equipment Corp., Mishawaka, Ind., and Whiting Corp., Harvey, Ill.

♦ ♦ ♦

Benjamin S. Sampson, formerly district sales manager, Stewart Industrial Furnace Division, Sunbeam Corp., Chicago, has ben appointed manager of the industrial Furnace and Oven Division, Claud S. Gordon Co., Chicago. This division will handle the company's expanded national sales, engineering and service activities on industrial furnaces and ovens.

♦ ♦ ♦

George Grant has been appointed West coast representative, Wellman Bronze & Aluminum Co., Cleveland, to handle the sale of its magnesium, aluminum and bronze, permanent mold and sand castings, wood and metal patterns. Mr. Grant was associated with W. S. Tyler Co., Cleveland, as a sales engineer for 20 years. Since 1945 he has been a manufacturers' representative of West Coast industries. His address is Post Office Box 4072, Los Angeles 24.

♦ ♦ ♦

Chain Belt Co., Milwaukee, has appointed **Douglas Jones** as manager of its Salt Lake City, Utah, district office, which will be operated there as the Douglas Jones Co., at 1551 Redondo Ave. Mr. Jones was graduated from University of Utah and took postgraduate work at Cornell University until 1936. Since that time he has been engaged in engineering and sales work in the Salt Lake City region.

♦ ♦ ♦

W. E. MacMullan has been appointed general manager of the Monessen Foundry Division, Rockwell Mfg. Co., Monessen, Pa. Mr. MacMullan joined Crane Co., Chicago, in 1922, as a metallurgist and in 1930 was placed in charge of all melting for the company. He was general manager for Webster Mfg. Co. in its Michigan City, Ind., foundry until 1933, when he was transferred to Wellsville, Mo., to operate two of the company's firebrick plants. Four years ago he went into business for himself as a manufacturers agent, handling industrial mining equipment and supplies.

♦ ♦ ♦

Walter A. Janssen, who recently retired from the Department of Commerce, has returned to business as an industrial consultant, with headquarters in the Hotel Occidental, Washington. Mr. Janssen, a graduate of University of Wisconsin, spent 16 years in the steel casting industry, with Bettendorf Co., Davenport, Iowa, Canadian Steel Foundries Ltd., Montreal, and American Steel Foundries, Chicago. From 1923 to 1938 he conducted his own business as industrial consultant with offices in Chicago and Pittsburgh. He then became chief of the Metals and Minerals Division, Bureau of Foreign and Domestic Commerce. In recent years he has served the department as consultant on iron and steel, nonferrous metals and minerals, and has worked closely with War Production Board and other government units.

♦ ♦ ♦

Harry R. Dahlberg recently became associated with the Twin City Testing & Engineering Laboratory, St. Paul, as metallurgical engineer. Prior to serving three years with the Navy during the war, he had been sand technician and radiographer with the Minneapolis Electric Steel Castings Co., Minneapolis. Upon returning to civilian life, he joined the faculty of Oregon State College as assistant professor of industrial engineering and was in charge of its foundry courses. While at the college, Mr. Dahlberg participated in the organization of an American Foundrymen's Society student chapter there, and last year served as program chairman of the society's Oregon Chapter.

♦ ♦ ♦

M. G. Holmes has been elected treasurer, Chicago Malleable Castings Co., Chicago, and its affiliated company, Allied Steel Castings Co., Harvey, Ill. He was formerly assistant comptroller, United States Gypsum Co., Chicago.

♦ ♦ ♦

George A. Krag, formerly foundry engineer, Mueller Co., Decatur, Ill., has retired. Mr. Krag entered the foundry industry as a boy, working as pattern clerk, and later in the pattern shop, Carondelet Foundry Co., St. Louis. He was pattern shop

(*Continued on page* 110)

RAY H. MOORE

BENJAMIN S. SAMPSON

GEORGE GRANT

FINALLY, A Disc-Wheel that:

- **BEVELS PREPARATORY TO WELDING**
- **SMOOTHS, BLENDS, STREAMLINES WELDS**
- **IS USED FOR PORTABLE CUT-OFF JOBS**
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At long last a type of abrasive disc-wheel has been developed that replaces costly, short-lived, coated abrasive discs. *BAYFLEX DISC-WHEELS,* for use on grinders and sanders last for hours and even days on the toughest weld smoothing jobs. The lost operator time of changing worn out coated discs is a thing of the past — thanks to Bayflex Disc-Wheels.

There is no substitute for Bayflex. Our manufacturing methods are different. Our finished product is superior. You be the judge of these statements. Ask for a demonstration . . . no obligation, of course.

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"Bayflex" is the registered trademark indicating manufacture by Bay State Abrasive Products Co.

Top Performance Consistently Duplicated

Men OF INDUSTRY

(*Continued from page* 108)

foreman, Lansenkamp-Wheeler Brass Works, Indianapolis, from 1915 to 1927, when he joined the Mueller Co. in the same capacity. In 1930 he became foundry engineer for its brass and gray iron foundries. Mr. Krag is now residing at 41 Claverach Drive, Clayton 5, Mo., and plans to establish his own business as a consultant.

♦ ♦ ♦

Fred B. Riggan, formerly foundry superintendent, Key Co., East St. Louis, Ill., has been appointed general manager in charge of manufacturing. Mr. Riggan attended Birmingham-Southern College and spent 5 years as a chemist until 1927, when he became associated with Stockham Valves & Fittings Inc., Birmingham, as a metallurgist. He joined Key Co. in 1938 as an associate metallurgist, later became chief metallurgist and was named foundry manager and general superintendent in 1948. Mr. Riggan is the author of various articles on alloy steel and core sands. **Arnold Czechowicz,** until recently assistant foundry superintendent, has been named to succeed Mr. Riggan as foundry superintendent. Mr. Czechowicz was associated with Hartford Electric Steel Corp., Hartford, Conn., and joined Key Co. in 1948 as assistant superintendent of the foundry.

Robert Jacoby, for the last 10 years plant metallurgist for the Key Co., has been named chief metallurgist. Mr. Jacoby attended Washington University and worked for a year in the malleable foundry division of Valley Steel Products Co., St. Louis, and for two years as chemist, East St. Louis Castings Co., East St. Louis, Ill. He has been assistant metallurgist under Mr. Riggan since 1938, with the exception of a year as senior metallurgist in charge of the metallographic section, Standard Steel Spring Co., Madison, Ill. Mr. Jacoby is an active member of the American Foundrymen's Society and American Institute of Mining and Metallurgical Engineers.

♦ ♦ ♦

Otto J. Leone has been appointed manager of industrial sales, Trion Inc., McKees Rocks, Pa., designers and manufacturers of electrostatic equipment for cleaning and purifying air and other gases. Mr. Leone, a graduate of Carnegie Institute of Technology, has been engaged in special engineering and consultant work for the last six months. Prior to that he was associated with John D. Hiles Co., Inc., Pittsburgh, as secretary and manufacturer's representative. Previous connections include the Bristol Co., Waterbury, Conn., Carnegie-Illinois Steel Corp., Pittsburgh, and Bacharach Industrial Instrument Co., Pittsburgh.

♦ ♦ ♦

A. J. Rinnander, until recently associated with Chicago Pneumatic Tool Co., New York, has joined Harnischfeger Corp., Milwaukee. Mr. Rinnander will supervise field activities, hoist distributors and sales on a national basis under direction of **E. W. Potratz,** manager of the Hoist and Crane Division, Milwaukee.

♦ ♦ ♦

Changes have been announced in home office and district office personnel, the Jeffrey Mfg. Co., Columbus, O., manufacturer of material handling, processing and mining equipment. **Russell W. Knode** has been appointed assistant manager of the export division. **Clark Allen** has been named head of the pricing department, replacing **E. F. Abram** who has retired. **F. E. McGovern** has been transferred to coal preparation sales. **Henry W. Nau** succeeds Mr. McGovern in the coal preparation engineering division.

J. R. Brisley, who has been working out of the Philadelphia district office, has been named district manager in Baltimore, succeeding **H. C. Rockwell,** who has returned to the product sales division in Columbus. **Charles E. Lawall Jr.,** a member of the home office student training division, has been assigned to the Philadelphia office, under **R. W. Sweitzer,** district manager there.

♦ ♦ ♦

The following sales personnel changes have been announced by Air Reduction Sales Co., New York.

J. B. Davenport has been appointed assistant manager of the Charlotte, N. C., district. **J. H. Hart** succeeds Mr. Davenport as assistant manager of the Detroit district. Mr. Hart was formerly assistant sales manager in Detroit, a position now held by **R. A. Jamieson. A. S. Blodget Jr.** has been appointed assistant manager of the Boston district.

♦ ♦ ♦

Ira E. Cruse, for the past 7 years coreroom superintendent, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., has been named foundry and coreroom superintendent, Sonith Industries Inc., Indianapolis.

♦ ♦ ♦

Carlton G. Hackman has been appointed foundry engineer, Mueller Co., Decatur, Ill., succeeding **George A. Krag,** who has retired.

♦ ♦ ♦

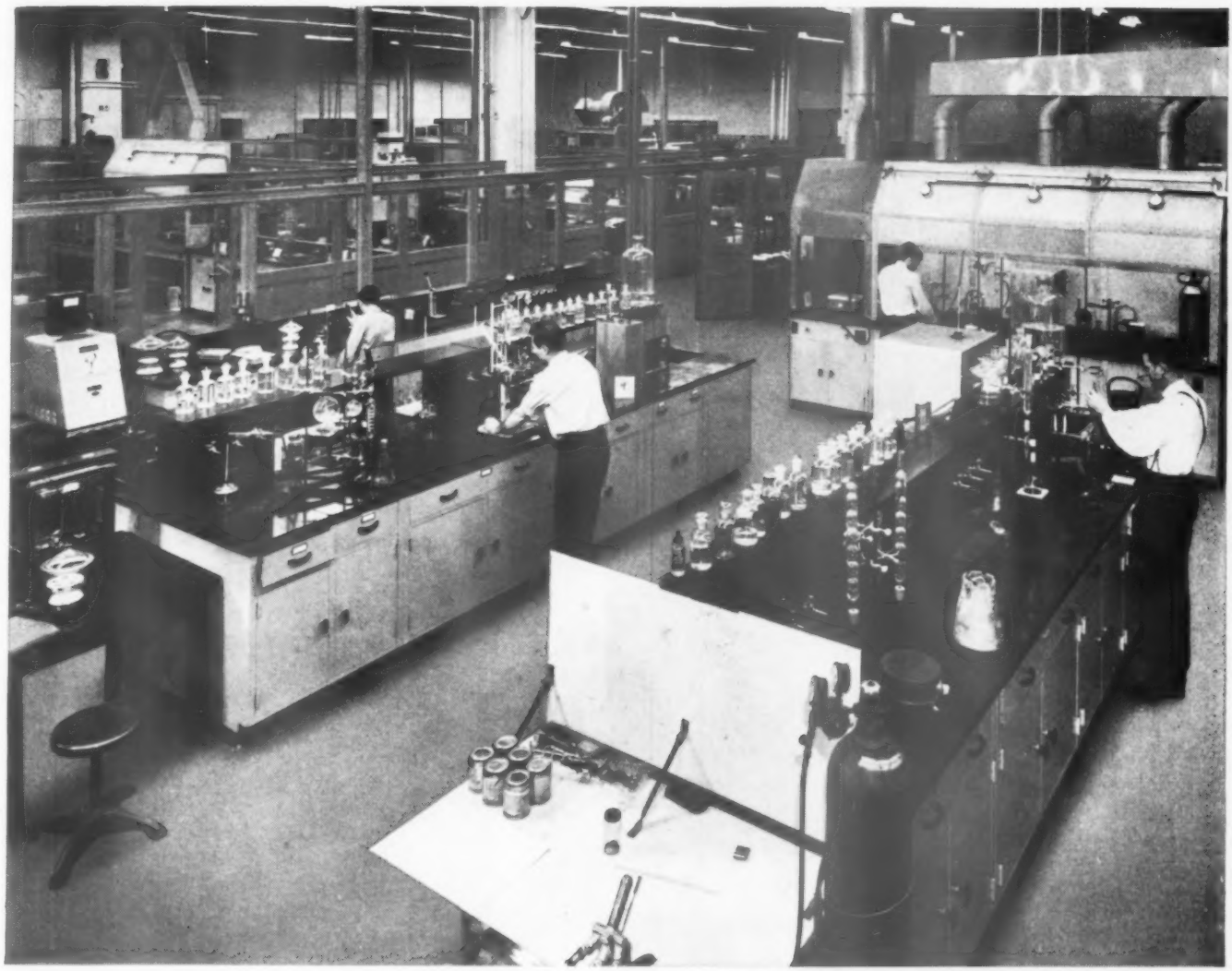
John R. Kingman has been appointed sales manager of the railway division, National Malleable & Steel Castings Co., Cleveland, with headquarters in Richmond, Va., succeeding **William Blackmore,** who has retired following 43 years of service.

(*Concluded on page* 114)

ARNOLD CZECHOWICZ

FRED B. RIGGAN

ROBERT JACOBY



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This is your grinding wheel laboratory

This is just one corner in the immense research and development laboratories of United States Rubber Company at Fort Wayne, Indiana.

Here "U. S." Abrasive Engineers work to lower your grinding wheel costs. They delve into every phase of bonds and abrasives, developing wheels that are more economical for snagging castings.

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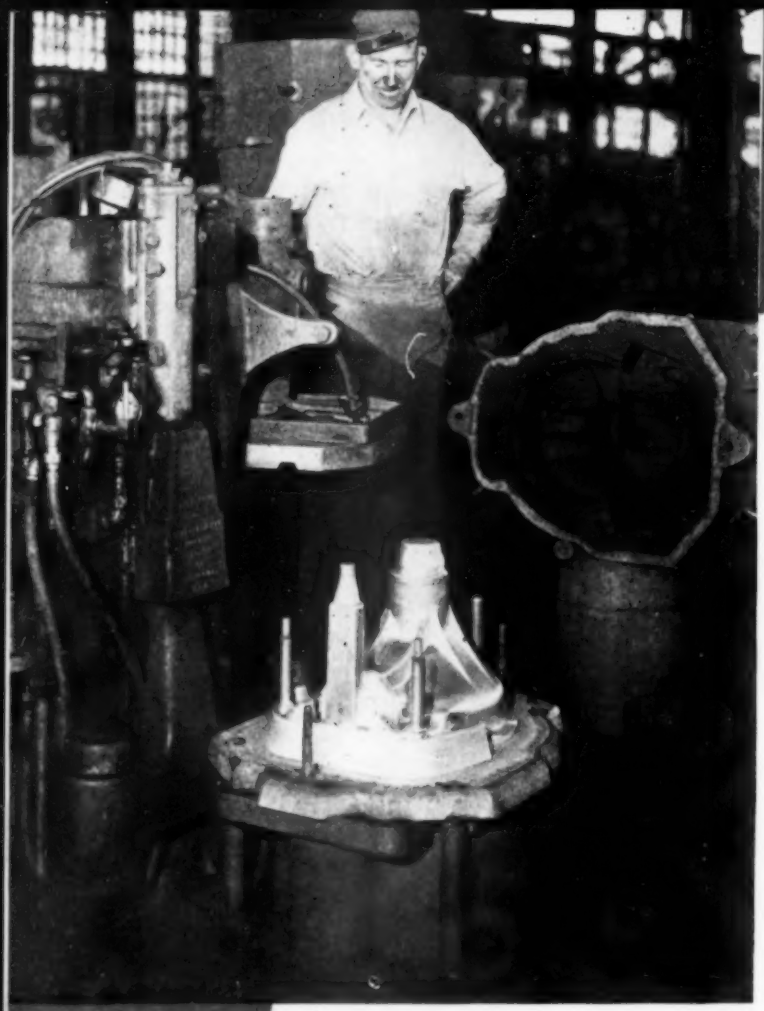
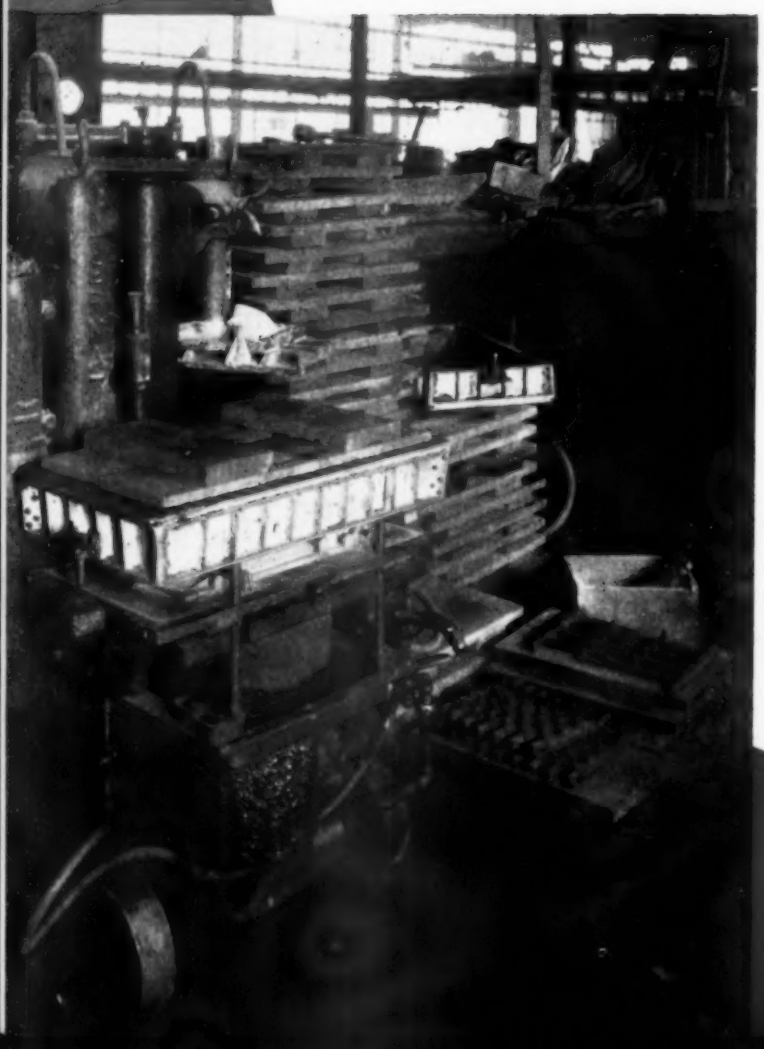
Take advantage of the "U. S." grinding wheel service. Write Grinding Wheel Dept., United States Rubber Company, Fort Wayne 4, Indiana.





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JOLT SQUEEZ

The heaviest, rugged duty type jolt, squeeze, pin push-up machine in the International Line.

Designed especially for handling heavy work.

Many variations of valving may be had for your particular needs.

INTERNATIONAL MOLD G

LA GRANGE I K

PK MACHINE

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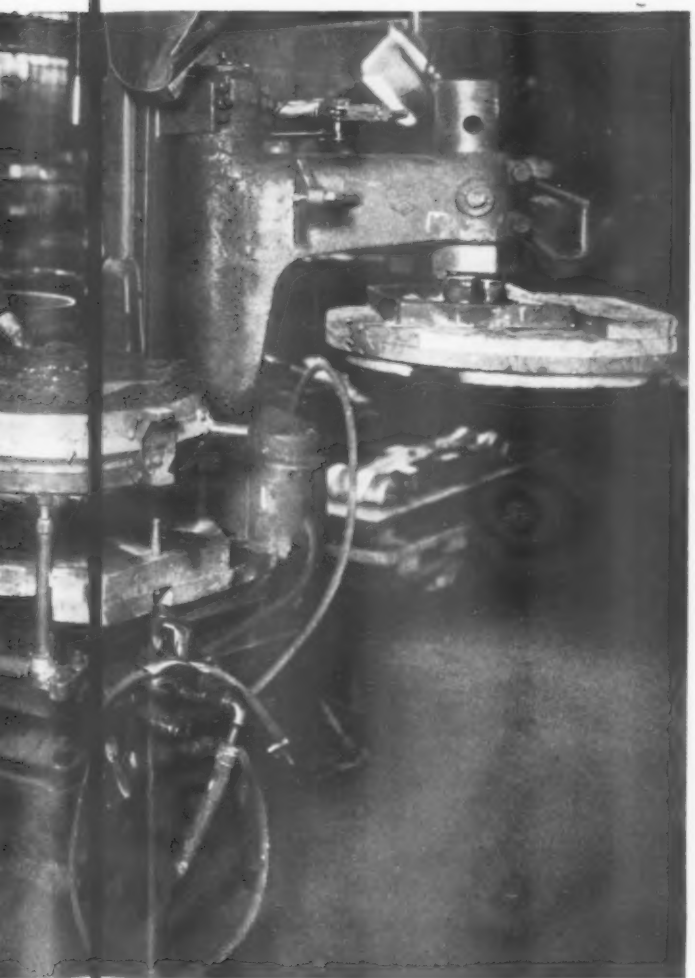
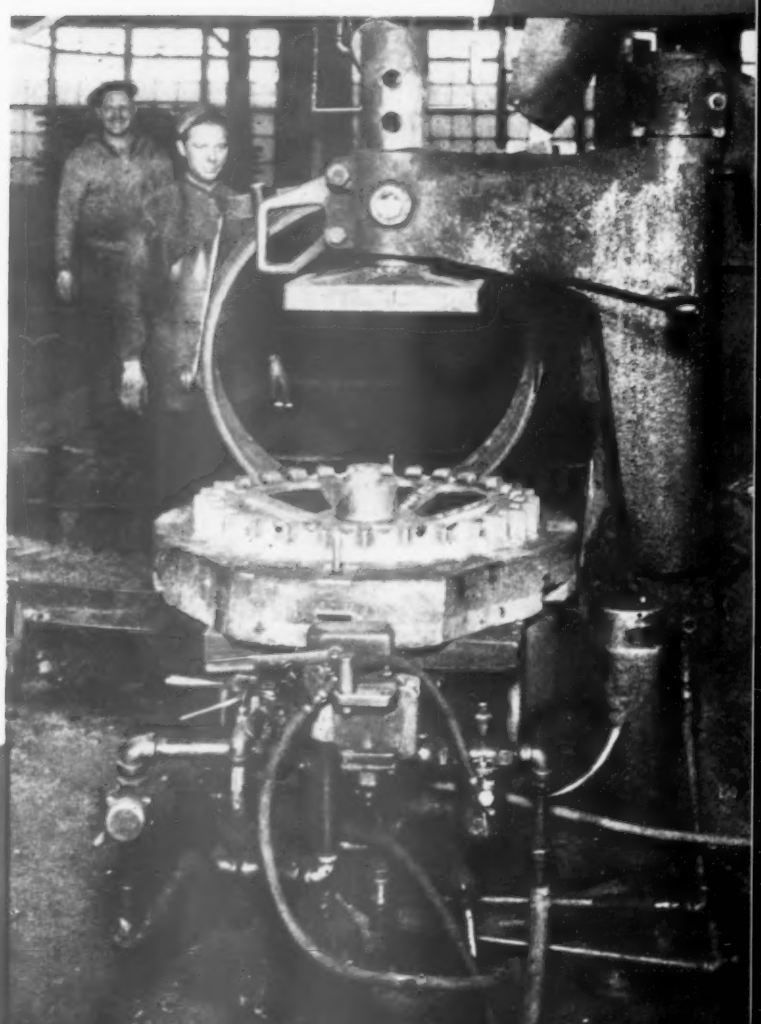
The Type PK is designed, as are all machines in the INTERNATIONAL LINE, by experienced foundry engineers who have a practical working knowledge of the problems of the business.

Inquiries should specify maximum outside width and length of the largest flask to be handled and the amount of the lift or draw required.





OLDG MACHINE COMPANY

NGE K, ILLINOIS

Men OF INDUSTRY

(*Concluded from page* 110)

Mr. Kingman, a graduate of Columbia University, took postgraduate work at University of Chicago and Northwestern University. He joined the company's engineering department in Cleveland in 1946, following military service, and was later transferred to the St. Louis office as a field engineer. He has been assistant manager of railway division sales in Richmond since 1947. Mr. Blackmore, who joined the company in 1906, served in various capacities until 1945, when he was appointed railway division sales manager in Richmond.

♦ ♦ ♦

Watson S. Hall, for the last 3 years a member of the service engineering staff, American Wheelabrator & Equipment Corp., Mishawaka, Ind., has joined **Robert Campbell** in the Toronto, Ont., sales office. Mr. Hall, a graduate of McGill University, Montreal, joined the company in 1936. Prior to that he was associated with Consolidated Mining & Smelting Works, North Ontario and Nova Scotia, and with the Sullivan Mines in British Columbia. He is a member of the Canadian Institute of Mining and Metallurgy.

♦ ♦ ♦

Arthur E. Focke, research metallurgist, Diamond Chain Co., Indianapolis, will be the next president of the American Society for Metals, Cleveland, and will take office Oct. 19 at the annual ASM meeting during the National Metal Congress & Exposition in Cleveland. **Walter E. Jominy,** staff engineer, Chrysler Corp., Detroit, will succeed Mr. Focke as vice president of the society.

♦ ♦ ♦

Frederick W. Trezise has been named head of the college of engineering science, Navy Pier Division, University of Illinois, Chicago, to succeed **Randolph P. Hoelscher,** who has been made head of the general engineering drawing department at the Urbana, Ill., campus of the university. Dean Hoelscher was transferred from Urbana to Chicago in 1946 when the Navy Pier Division was opened. Dean Trezise has been chairman of engineering sciences at the university's Galesburg Undergraduate Division, Galesburg, Ill., now closed.

♦ ♦ ♦

John R. Cary has been appointed sales manager, Browning Crane & Shovel Co., Cleveland, succeeding **William H. Waite** who has retired following a long period of service with the company.

♦ ♦ ♦

K. W. Rhoads, for the last 6 years associated with the Detroit Electric Furnace Division, Kuhlman Electric Co., Bay City, Mich., has been appointed to handle its sales activities in metropolitan New York, New York state and New England, with headquarters in the eastern division sales office, New York. O. M. Hullinger is eastern sales manager for the division.

♦ ♦ ♦

E. A. Loesser has been appointed foundry materials buyer,B. F. Avery & Sons Co., Louisville, succeeding **E. E. Miller** who has been transferred to the cost records department.

♦ ♦ ♦

William Probst, formerly of Kansas City, Mo., has been appointed foundry superintendent, C. Lee Cook Mfg. Co., Louisville, succeeding **E. L. Duke.**

Retires After 63 Years in Foundry Industry

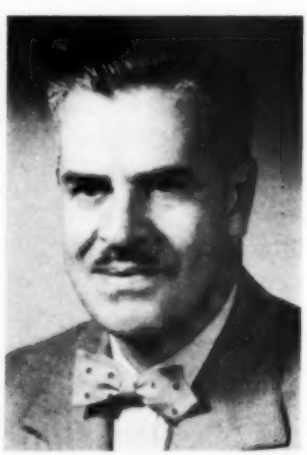
ADOLPH J. RICKER, one of the founders and president, Badger Malleable & Mfg. Co., South Milwaukee, Wis., has retired from active service after 41 years with the organization. He has been succeeded by **C. MacLeod Lewis,** formerly secretary-treasurer of the company. Mr. Ricker entered the foundry industry 63 years ago, as a pattern shop apprentice at the Northwestern Malleable Iron Co., Milwaukee, and several years later became pattern shop foreman, Moore Mfg. & Foundry Co., South Milwaukee, later known as the Stowell Co. Following a period as plant superintendent with Stowell Mr. Ricker, together with H. M. Lewis and Dr. Sidney Smith, a local physician, organized the Badger Malleable & Mfg. Co., in 1908. Mr. Ricker, at the outset, served as president, general manager, purchasing agent and construction superintendent of the new plant. Mr. Lewis served as secretary-treasurer, and Dr. Smith was vice president.

The company started with little financial backing, and in looking back, Mr. Ricker believes the toughest period was during 1908 and 1909, after the plant was completed. Business was at a low ebb and it was three or four months before Mr. Ricker landed a sizable order from a Chicago company that kept the foundry operating at full capacity for two years. A little later business looked promising and Mr. Ricker and Mr. Lewis decided to double the plant capacity. The bottom dropped out of business just when the addition was completed but the organization again was able to pull out of that difficulty.

Mr. Lewis, the new president, is the son of H. M. Lewis, a co-founder of the company. He joined Badger Malleable following graduation from University of Wisconsin in 1916, working summers prior to graduation, in the pattern, coremaking and molding departments of the company. During World War I, he was a captain in the Engineers Corps. He has been secretary-treasurer for the last 10 years.

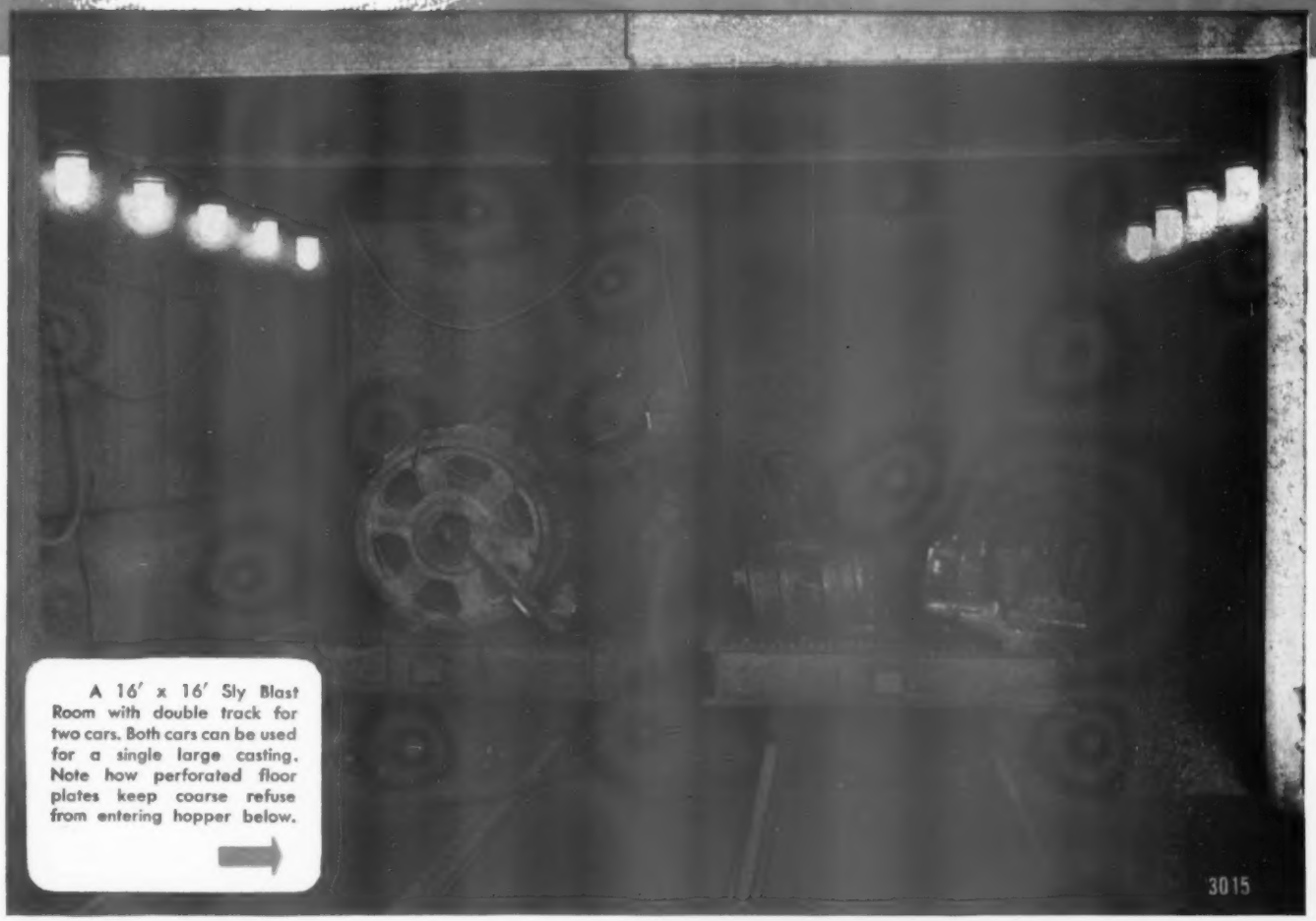
T. E. Ward, who succeeds Mr. Lewis as secretary-treasurer, joined the Stowell Mfg. & Foundry Co., South Milwaukee, in 1906, and became its secretary-treasurer in 1916, when it was reorganized. He joined Badger Malleable in 1925 as sales manager. Other officers of the company are **Leo Joerg,** assistant secretary, and **A. F. Schwan,** assistant treasurer.

ADOLPH J. RICKER

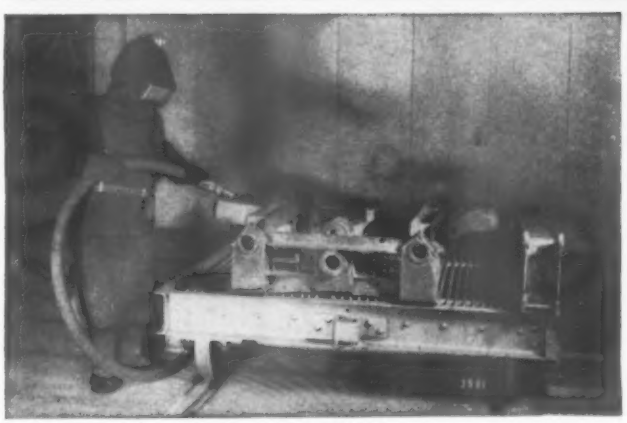


C. MacLEOD LEWIS

SLY ARMOURED* BLAST ROOMS



A 16′ x 16′ Sly Blast Room with double track for two cars. Both cars can be used for a single large casting. Note how perforated floor plates keep coarse refuse from entering hopper below.



This view shows a Sly Blast Car in a Sly Blast Room. Perforated floor plates are supported by grating preventing plates from warping. Observe how tops of rails are flush with floor. Operator wears a Sly "Purair" Helmet.

Whatever Size Your Castings

And whatever your tonnage we have a standard blast room to suit. have built blast room equipment for the cleaning of the inside of cars, for large airplane fuselages, for structural assemblies, tanks, rail cars and locomotives. Some large blast rooms are self-contained build

Standard Sly Blast Rooms

Inside Width: 8 ft., 10 ft., 12 ft., 14 ft., 16 ft.
Inside Length: 8 ft., 10 ft., 12 ft., 14 ft., 16 ft.
Inside Height: 7 ft. 3 in., 8 ft. 3 in., 9 ft. 3 in.
Larger Blast Rooms for special purposes.

*** ARMOURED** — **An extra layer of detachable 3/16" steel wear plates to protect the walls.**
An extra layer of steel grating to reinforce the floor against sagging.
(Exclusive Sly features)

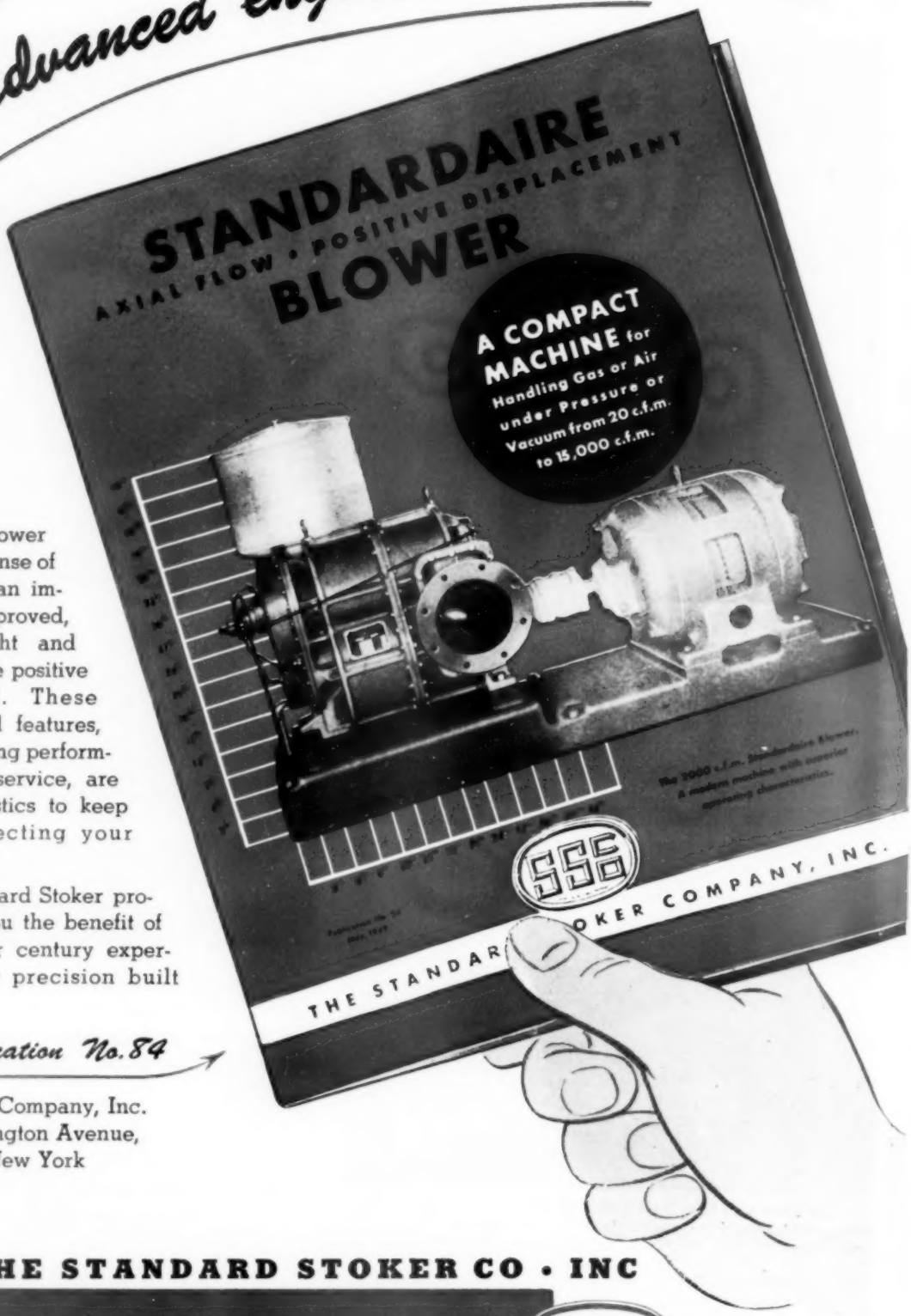
THE W. W. SLY MANUFACTURING CO.

4753 TRAIN AVENUE • CLEVELAND 2, OHIO

Representatives in New York • Chicago • Philadelphia • Detroit • St. Louis
Toronto • Minneapolis • Cincinnati • Rochester • Los Angeles • Birmingham

Here's a New Blower

with advanced engineering features


STANDARDAIRE
AXIAL FLOW • POSITIVE DISPLACEMENT
BLOWER
A COMPACT MACHINE for Handling Gas or Air under Pressure or Vacuum from 20 c.f.m. to 15,000 c.f.m.
SSB
THE STANDARD STOKER COMPANY, INC.

The Standardaire Blower is modern in every sense of the word - it fulfills an important need for an improved, compact, light-weight and efficient blower in the positive displacement field. These carefully engineered features, plus superior operating performance and quieter service, are desirable characteristics to keep in mind when selecting your blower requirements.

In offering this Standard Stoker product, we also give you the benefit of more than a quarter century experience in producing precision built equipment.

Write for Publication No. 84

The Standard Stoker Company, Inc.
Dept. A14, 370 Lexington Avenue,
New York 17, New York

THE STANDARD STOKER CO • INC

A PRODUCT OF **Standard Stoker** SSB

NEW YORK • CHICAGO • ERIE • MONTREAL

FOUNDRY Statistics

Foundry Production Workers

ESTIMATED NUMBER:

Type Foundry	Apr. 1949	Mar. 1949	Apr. 1948
Gray Iron	95,100	101,600	116,600
Malleable Iron	31,100	33,600	37,200
Steel	65,400	70,500	72,300
AVERAGE WEEKLY EARNINGS:			
Gray Iron	$51.43	$53.90	$56.39
Malleable Iron	51.34	52.76	56.77
Steel	57.86	60.55	60.13
AVERAGE WEEKLY HOURS:			
Gray Iron	35.2	36.7	40.2
Malleable Iron	34.5	35.6	39.8
Steel	37.7	39.4	41.2

Source: Bureau of Labor Statistics. Estimates of number of foundry production workers adjusted to Federal Security Agency data through 1945.

Index of Foundry Equipment Orders

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1948	1949
Jan.	380.9	149.9
Feb.	367.3	144.4
Mar.	326.2	190.8
Apr.	412.0	172.0
May	388.5	121.9
June	376.8	164.9
July	456.3	....
Aug.	324.7	....
Sept.	273.5	....
Oct.	296.0	....
Nov.	284.4	....
Dec.	243.7	....

Note: Figures are percentages of the base period 1937-1939 taken as 100 per cent (monthly average). Source: Foundry Equipment Manufacturers Association.

Castings Production

In Philadelphia Federal Reserve District

(June, 1949)

Type	Percentage Change From May, 1949	Percentage Change From June, 1948
Gray Iron	+ 5.7	—44.5
Malleable Iron	—26.9	—76.3
Steel	—37.7	—53.0
Nonferrous	+38.3	—61.9

Source: University of Pennsylvania.

Shipments of Castings

(Reported by Bureau of the Census)

Gray Iron Castings

(Net tons)

	Shipments—Total	Shipments—For Sale	Unfilled *Orders
1947			
Total	12,540,960	7,181,299	.....
1948			
Feb.	1,024,450	571,406	2,769,408
Mar.	1,169,085	659,821	2,726,415
Apr.	1,051,083	584,969	2,690,893
May	992,692	555,728	2,601,626
June	1,072,040	597,624	2,587,081
July	914,464	490,359	2,601,084
Aug.	1,050,948	597,678	2,598,789
Sept.	1,088,051	615,978	2,587,385
Oct.	1,148,422	642,485	2,522,831
Nov.	1,099,827	606,380	2,406,737
Dec.	1,110,512	624,739	2,284,348
Total	12,785,909	7,131,405	.....
1949			
Jan.	1,040,343	573,164	2,064,861
Feb.	986,591	535,163	1,857,403
Mar.	1,074,704	567,041	1,639,465
Apr.	929,307	467,433	1,445,532
May	866,631	439,420	1,243,266

Steel Castings

(Net tons)

	Shipments—Total	Shipments—For Sale	Unfilled *Orders
1947			
Total	1,625,055	1,203,504	.....
1948			
Feb.	142,434	107,762	497,097
Mar.	162,891	125,550	508,822
Apr.	150,305	114,896	472,370
May	143,337	111,616	482,531
June	152,894	117,794	469,973
July	120,445	87,927	497,410
Aug.	140,223	107,538	472,481
Sept.	149,222	112,551	447,972
Oct.	152,983	114,819	424,460
Nov.	146,835	110,275	395,013
Dec.	157,395	116,285	354,458
Total	1,760,032	1,335,295	.....
1949			
Jan.	140,577	103,503	338,889
Feb.	135,042	99,425	320,202
Mar.	138,889	102,027	284,754
Apr.	119,953	83,277	250,506
May	106,178	75,537	191,473

Malleable Iron Castings

(Net tons)

	Shipments—Total	Shipments—For Sale	Unfilled *Orders
1947			
Total	895,054	513,228	.....
1948			
Mar.	86,767	50,065	203,351
Apr.	80,602	46,034	199,578
May	76,078	42,338	191,553
June	81,747	48,170	178,760
July	64,995	35,018	180,421
Aug.	73,272	41,201	176,824
Sept.	77,815	43,985	164,002
Oct.	81,761	44,305	158,351
Nov.	77,194	42,241	146,422
Dec.	79,882	43,397	137,385
Total	933,265	525,212	.....
1949			
Jan.	71,876	38,040	126,393
Feb.	66,744	35,074	118,318
Mar	72,052	38,143	102,379
Apr.	61,329	31,728	94,958
May	54,572	27,643	78,944
June	59,597	32,639	69,865

Aluminum Castings

(Thousands of pounds)

	Shipments—Total	Shipments—Sand	Shipments—Perm. Mold	Unfilled *Orders
1947				
Total	441,996	155,112	174,515	.....
1948				
Feb.	37,963	12,177	15,055	88,032
Mar.	41,794	13,343	16,258	78,344
Apr.	38,269	12,407	14,563	78,499
May	33,868	11,854	12,351	75,219
June	35,822	12,296	13,239	72,930
July	28,944	9,851	10,504	70,321
Aug.	32,136	9,883	13,174	68,334
Sept.	35,877	11,822	13,353	66,773
Oct.	35,542	11,733	13,216	65,538
Nov.	34,550	11,410	13,012	63,767
Dec.	31,836	10,335	11,589	59,154
Total	424,490	139,781	161,334	.....
1949				
Jan.	29,142	9,702	10,386	55,580
Feb.	27,228	9,286	9,339	52,916
Mar.	27,478	9,348	9,386	50,508
Apr.	23,801	8,041	8,353	45,638
May	21,392	7,582	7,293	41,460

Copper-base Alloy Castings

(Thousands of pounds)

	Shipments—Total	Shipments—Sand	Shipments—Perm. Mold	Unfilled *Orders
1947				
Total	1,051,742	960,732	51,139	.....
1948				
Feb.	87,169	79,329	4,509	71,143
Mar.	96,344	87,249	5,261	70,544
Apr.	89,035	80,426	4,705	70,726
May	81,286	72,982	4,910	65,818
June	84,817	76,241	5,148	64,149
July	71,803	64,389	4,670	66,014
Aug.	81,976	73,947	5,018	69,126
Sept.	86,973	78,830	4,999	66,574
Oct.	91,311	82,463	5,293	62,571
Nov.	86,497	77,751	5,107	60,892
Dec.	88,182	79,750	4,796	53,671
Total	1,030,825	930,790	59,009	.....
1949				
Jan.	76,348	68,379	4,593	48,124
Feb.	68,776	61,278	3,951	40,517
Mar.	70,173	62,557	3,927	37,646
Apr.	59,573	52,837	3,458	32,746
May	53,699	48,004	2,830	30,926

Magnesium Castings

(Thousands of pounds)

	Shipments—Total	Shipments—For Sale	Unfilled *Orders
1947			
Total	7,693	7,050	....
1948			
Feb.	655	591	2,866
Mar.	704	625	2,741
Apr.	673	605	2,640
May	622	542	2,673
June	709	624	2,712
July	554	521	2,684
Aug.	703	655	2,834
Sept.	745	700	3,206
Oct.	708	650	3,070
Nov.	728	683	3,416
Dec.	754	695	3,455
Total	8,214	7,488	....
1949			
Jan.	822	761	3,821
Feb.	813	756	3,586
Mar.	879	800	3,227
Apr.	726	669	3,234
May	778	726	2,885

* For sale only.

HOW TO CONTROL FUMES

In Nonferrous Melting

By ROBERT H. HALEY
Advance Aluminum & Brass Co.
Los Angeles

As Told to HOWELL H. BARNES
Assistant Manager
Los Angeles Chamber of Commerce

IN 1947 the state of California passed a law which seeks to control the pollution of atmosphere. It provides that when the board of supervisors of any county in the state "finds" air of that particular county polluted with contaminants injurious to health, that obstructs the free use of property or that is offensive to the senses, it may constitute an Air Pollution Control District.

With regard to the extent of its controls, the law reads in part: "A person shall not discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public. . . ."

To date enforcement has not reached the point beyond which industry cannot operate, but the language of the law is a Sword of Damocles hanging by the tenuous thread of judgment as to how far the regulation shall be carried. There is no doubt but that in the nonferrous foundry industry it will take new techniques and procedures to meet this challenge and still remain in a competitive position.

Some of the larger foundries operating exclusively on high-zinc alloys may be compelled to equip their plant with collecting equipment, but 90 per cent of the plants now operating can do much in the way of improvement without too great an expense. It is the opinion of good authority that it is possible to operate the average aluminum foundry without collecting systems of any kind and remain within the allowable limits of the California law. Copper, high tin or nickel bronze can be melted with practically no emissions, but magnesium foundries should study carefully the use of sulphur to effect necessary improvement. With proper care no trouble should be experienced with red brass.

Robert R. Haley, left, points out to Dr. L. C. McCabe the complete elimination of zinc oxide fumes when using new technique developed by the Nonferrous Smog Committee. Both crucibles contain 150 lb of yellow brass ready to pour. Charles Maxey (right), Peabody-Acker Inc., Los Angeles, which has adopted this system, looks on

Melting metals without objectionable emissions is much like the making of coffee. Involved in each case is a clean receptacle in which the materials are to be cooked; the proper proportion of the ingredients to be processed; the correct time of exposure to the heat. It is also true that good housekeeping and horsesense play a large part in the program of improvement.

At the Advance Aluminum & Brass Co. we use crucibles regularly and a tilt furnace infrequently. Our crucibles are sunk into pits with the top slightly above the floor level. We clean the pits at regular and frequent intervals which allows us to use the pit as a skimming dump and keeps the dross in workable sizes. The pits are heavily grated so that the furnaceman can work in close proximity to the melting operation without danger from slop-over or spillage.

When the pits are constructed they should be of ample size to permit proper combustion, with ingot-shape grooves permanently formed below the furnace in the pit floor. Metal that runs into this groove is easily removed, in suitable shape to remelt.

Fuel waste and improper combustion can occur when the chamber is not in correct proportion to the crucible, a condition that can produce a smoking furnace. When oil is used as fuel a small amount of smoke can be expected at the "light-off" which will disappear when the furnace reaches the proper temperature. Some foundrymen have found that preheating the furnace with a gas flame will keep at a minimum the smoke emissions and also fuel waste.

Correct Burner Adjustment Helps

Another preliminary consideration to good operation is the adjustment of the burner. We believe that burners adjusted to produce an oxidizing flame will melt faster, but most experience in our community seems to seek a neutral flame. Good engineering design of burners will produce the kind of heat required for each installation. Another serious problem is the gradual increase in the sulphur content of our fuel oils, and in part this can be rectified by preheating the heavier oils.

The blower should be of sufficient size to provide extra or reserve capacity and equipped with proper controls to permit regulation within the fine limits required for best combustion. Constant care and maintenance of the furnace linings is of prime importance. Each day all cracks should be patched and obstructions chipped away, leaving the inside face of the chamber smooth to permit an uninterrupted flow of the hot gases with as little turbulence as possible. This is particularly important when liquid fuel is used, as surface deformities tend to break down the vapor into droplets of oil which interfere with complete combustion. Also it will be helpful in maintaining the cover if it is replaced as soon as possible after the crucible has been withdrawn. After

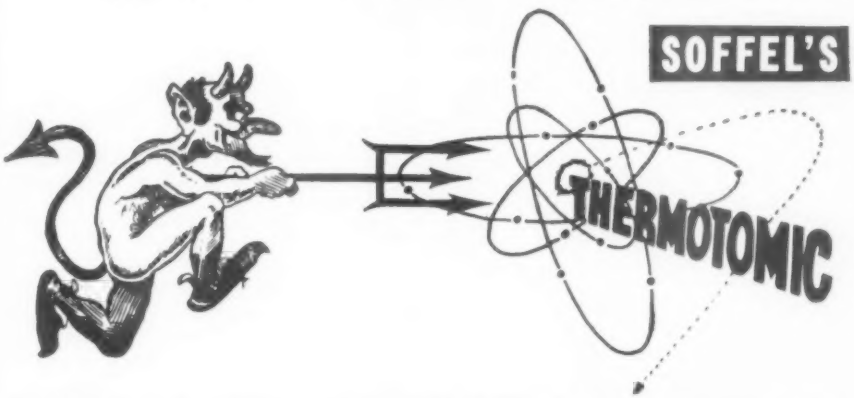
(*Concluded on page* 121)

SOFFEL'S
THERMOTOMIC
(PATENTED)
AND CARBON FREE LIQUIDIZER
(EXOTHERMIC METAL FEEDING COMPOUND)

√ Cut Casting Costs
√ Make Better Castings

FOR STEEL, STAINLESS STEEL, IRON, BRASS, BRONZE, COPPER & ALUMINUM

Better castings, more economically produced, result from the use of Soffel's Thermotomic and Carbon Free Liquidizer, the exothermic metal feeding compounds which keep feeding metal molten longer.



Reduces Sizes of Risers and Feeder Heads

Heads and Risers Removed without Cutting and Burning

Increases Yield

Eliminates Shrinkage and Piping in Castings

THERMOTOMIC FOR ALL METALS AND ALLOYS

THERMOTOMIC is a patented exothermic compound that can be molded into any desired shape and used as a feeding insert under risers or as a facing application where it is desired to maintain fluidity of the casting metal. It produces temperatures up to 3500° F. and is available in several brands designed to fit your individual needs.

STANDARD THERMOTOMIC—For use in dry sand molds with steel, stainless metals, gray or malleable iron, copper and bronze.
THERMOTOMIC W. P. (Waterproofed)—For use in green sand molds with any of the above metals. Cores or inserts made of THERMOTOMIC W. P. may be left in green sand for several hours or overnight without absorbing moisture from the mold.

THERMOTOMIC X-236—Has a double exothermic reaction, that is, after having burned through once, the terrific heat developed serves to set off another chain of chemical reactions within the material causing it to burn again with the development of even greater heat than that produced by the first burning. Recommended for chrome nickel steel and other high temperature metals.

THERMOTOMIC ABC—For aluminum and magnesium. When used as a ring core under feeding heads or risers, chills in the molds can now be eliminated because the feeding metals in the heads will remain liquid longer than the casting in the mold.

SOFFEL'S CARBON FREE LIQUIDIZER

Soffel's Carbon Free Liquidizer is a scientific development for replacing common carbonaceous "head compounds" or "pipe eliminators" used to control shrinkage in the production of ingots and castings.

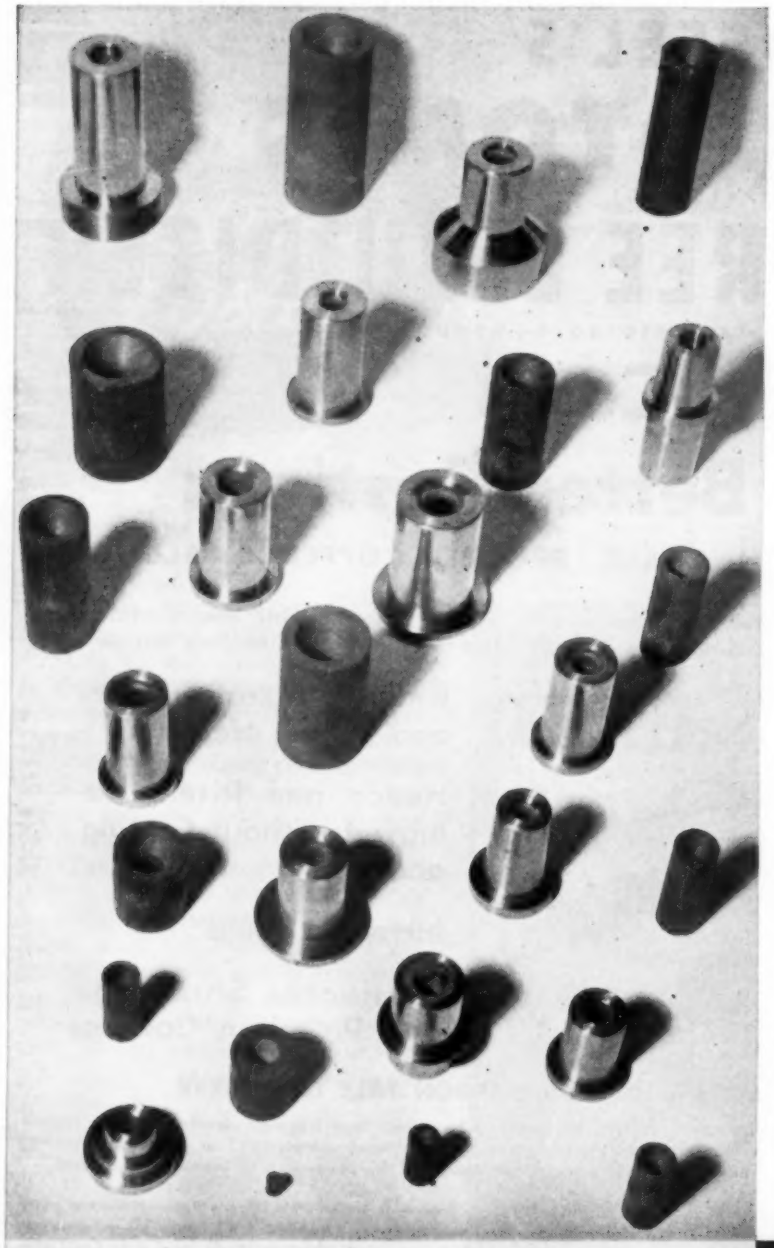
Soffel's Carbon Free Liquidizer is different from ordinary head compounds in two ways: it is CARBON FREE, thereby eliminating carbon pick-up in alloy irons and stainless steels, and it is EXOTHERMIC. Carbonaceous materials, regardless of their composition, may cause carbon pick-up, segregation, non-uniform grain structure, and hard spots under risers and in castings. They contribute no heat value whatever and serve only to insulate the metal in feeding heads and risers. SOFFEL'S CARBON FREE LIQUIDIZER, on the other hand, is entirely free from carbon in any form and will NOT contaminate any metal or alloy in any way. In addition, when applied on the heads or risers and stirred into the metal, the LIQUIDIZER reacts with itself exothermically producing a temperature above 3200°F. This heat actually increases the temperature of the feeding metal to a point well above that of the metal in the main body of the casting, thus ensuring that the feeding metal will be the last to freeze. In this manner, shrink cavities in the casting caused by premature freezing of the feeding metal are eliminated. After the exothermic action has ceased, the LIQUIDIZER forms a soft, insulating blanket on the metal. This confines the heat generated by the LIQUIDIZER and aids in maintaining the high temperature of the feeding metal in the heads or risers.

BEWARE OF IMITATIONS! We Are the Originators of CARBON FREE LIQUIDIZERS and THERMOTOMIC COMPOUNDS

Pittsburgh Metals Purifying Co.

World's Largest Manufacturers of Fluxes and Purifiers for All Metals and Alloys.

1352 Marvista St., N. S. **Pittsburgh 12, Pa.**



For Savings and Service

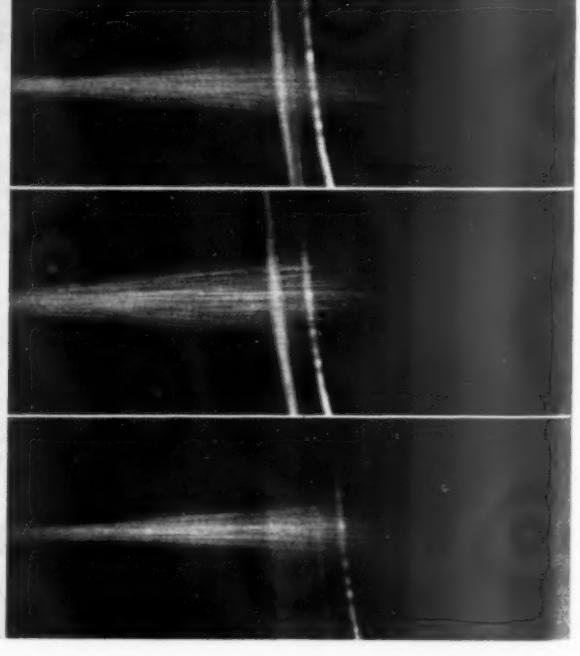
NORBIDE® *Blast Nozzles*

HERE ARE THREE GOOD REASONS why it pays to purchase NORBIDE pressure blast nozzles:

1. They give more service per dollar cost than any nozzle now available—guaranteed to give 750 hours with silica sand and 1,500 hours with steel grit before the orifice diameter enlarges one and one-half times. One NORBIDE nozzle will often outwear 1,000 iron ones.
2. The wear-resistance of NORBIDE nozzles decreases air consumption from 10% to 20% as compared with iron nozzles because the nozzle retains its original orifice for a long period of service.
3. NORBIDE nozzles increase production and improve blasting efficiency. Time is *not* lost for frequent changes of worn-out nozzles. And because the nozzle orifice is not readily worn larger, abrasive velocity remains more uniform with the maximum of cleaning efficiency and economy.

NORBIDE nozzles are made of Norton Boron Carbide—the hardest material made by man.

NORTON COMPANY
Worcester 6, Massachusetts



High-speed photograph of stream from new iron nozzle—note that stream concentration and abrasive velocity and volume are fair

Stream from the same nozzle after three hours with silica sand. Outlet opening worn to twice original size—stream concentration poor, abrasive velocity and volume low

Stream from Norbide Nozzle after 404 hours with sand—outlet diameter worn only 0.032"—hundreds of hours of useful life remain—marked stream concentration—high abrasive velocity and volume

(*Concluded from page* 118)

the last heat has been run we generally place the crucibles back in the furnace, put the cover in the melting position and let the whole installation cool simultaneously.

All pipe connections should be tight and kept that way. Before a crucible is put in use it should be brought up to furnace heat and can be set on a stool in the combustion chamber. The stool should permit not less than 2½ inches between the lip of the crucible and the underside of the cover.

Cleanliness in and around the furnace is most important. Although it is possible to maintain correct procedures in a messy furnace area, we find that the best results are obtained when the furnaceman is not only conscious of an orderly and well kept furnace area but is trained to keep it that way.

Use of Flux Is Suggested

Before any metal is introduced into the crucible the flux should be added so that as melting takes place a crust will be formed at sufficient thickness to keep the molten metal covered. In the melting of alloys containing zinc, if the quantity of flux is carefully controlled, a minimum of emissions will result in either the melting or the pouring. Opinion is divided among foundrymen throughout the country with regard to flaring yellow brass and manganese bronze before pouring. Although I will readily admit that both of these metals should be poured hot, I have never poured a casting that required boiling metal or flaring.

In addition to the saving of time, the limiting of undesirable emissions, and the waste of metals burned off, the elimination of flaring also lessens the possibility of dross streaks. Before the development of either the thermocouple type or optical type pyrometers, foundrymen used the old rod or poker technique, to determine when the metal was hot enough to pour and at the point of flaring. We still have more faith in the old method as a dependable means of gaging when yellow brass or manganese bronze is "ready." We use a metal rod or a poker, approximately ¾ inches in diameter, which is inserted through the molten metal to the bottom of the crucible. When a biting sensation is felt at the other end we know that the metal is at or near the boiling or flaring temperature. Slowly withdrawing the rod will permit the operator to follow the flaring action as it rises through the metal.

Our practice is to withdraw the crucible from the furnace when the biting action is first noticed, as the interval of time required for this operation is not much more than the time required for the flaring action to reach the top. If we find the biting action within 3 inches from the top we turn off all fires in the furnace and delay further heating until the action is again at the bottom of the melted metal.

When the crucible has reached the skimming floor we form two sprues in the slag cover on top of the metal, one through which we will pour, the other to permit the entrance of air. It is possible to hold escaping oxides to a minimum either utilizing patented attachments to hold back the slag at the pouring sprues or with the use of a hand-operated skimmer.

The most important factor in the whole melting process is the human element or the furnaceman. Many small foundries and some fairly large ones select their furnacemen from one of the helpers and limit their training to a minimum of general instruction. It is questionable if many of them know why the flux is added. I have seen some who have never been instructed on how to light a furnace. Too often they have been allowed to develop their own traits and habits without regard for good metallurgy or good foundry practice. In the Los Angeles area it has been estimated that of the 150 foundries in operation only about 25 employ competent furnacemen who have been carefully trained for the job.

In the California area the recent activities in elimination of smog and curtailment of emissions from manufacturing processes have brought squarely up to the foundry operator the necessity to face the problem and do something about it. It has been demonstrated that foundry operations which involve the use of small crucibles can be so conducted as to meet the regulations as laid down in Los Angeles. And we are told that the regulations in Los Angeles are more rigid with regard to emissions resulting from the melting of nonferrous metals than in any other community in this country. Local enforcement officials have been enthusiastic over the reductions accomplished by following the simple methods outlined in this article. To sum up, these points have been emphasized:

1. The need for correct furnace construction.
2. The maintenance of a clean and orderly workshop.
3. The care employed in selecting exactly the right temperature to withdraw the metal and prevent flaring.
4. The utilization of the flux and slag as a crucible cover to prevent contamination of the molten metal and the emission of oxides.
5. The necessity for a furnaceman with qualifications equal to the requirements of the job.

Munitions Board Names Foundry Advisory Body

MEMBERS of a Foundry Industry Advisory Technical Subcommittee have been announced by the Munitions Board, Washington. Max Kuniansky, vice president and general manager, Lynchburg Foundry Co., Lynchburg, Va., has been appointed chairman of the committee, with Lt. Col. F. H. Holmes, USAF Materials Resources, acting as liaison officer.

Other committee members are: George J. Behrendt, managing director, Eastern Malleable Iron Co., Naugatuck, Conn.; Charles W. Briggs, technical director, Steel Founders' Society of America, Cleveland; Charles O. Burgess, technical director, Gray Iron Founders' Society, Cleveland; Thomas E. Eagan, chief metallurgist, Cooper-Bessemer Corp., Grove City, Pa.; Walter W. Edens, works manager, Badger Brass & Aluminum Foundry Co., Milwaukee; Richard A. Flinn Jr., metallurgist, American Brake Shoe Co., Mahwah, N. J.; Roy A. Gezelius, assistant works manager, General Steel Castings Corp., Eddystone, Pa.; John W. Juppenlatz, chief metallurgist, Lebanon Steel Foundry, Lebanon, Pa.

James H. Lansing, technical and research director, Malleable Founders' Society, Cleveland; Carl F. Lauenstein, chief metallurgist, Link-Belt Co., Indianapolis; G. A. Lilliequist, research director, American Steel Foundries, East Chicago, Ind.; S. C. Massari, technical director, American Foundrymen's Society, Chicago; Charles E. Nelson, technical director, Magnesium Division, Dow Chemical Co., Midland, Mich.; Donald J. Reese, metallurgist, International Nickel Co., New York; John S. Roberts, metallurgist, American Manganese Bronze Co., Philadelphia; Howard J. Rowe, chief metallurgist, Castings Division, Aluminum Co. of America, Pittsburgh; Harry M. St. John, superintendent, Crane Co., Chicago; A. E. Schuh, director of research, U. S. Pipe & Foundry Co., Burlington, N. J.; Gosta Vennerholm, supervisor, metallurgical research, Ford Motor Co., Dearborn, Mich.; R. E. Ward, chief metallurgist, Eclipse-Pioneer Division, Bendix Aviation Corp., Teterboro, N. J.

INDUSTRY Briefs

BUILDINGS and equipment of the Lindal Foundry Division, American Gear Works, plant at 5904 West Ogden Ave., Chicago, have been purchased by Ogden Foundry Inc., a firm newly organized by four former officials of Love Bros. Inc., Aurora, Ill. Founders and executives of the new company are: Arthur K. Sanderson, president and general manager; Roy Frazier, vice president and works manager; James W. Hawking, sales manager and treasurer; and Philip Wright, secretary. Ogden Foundry Inc. is a gray iron foundry specializing in gears, pulleys and general jobbing.

* * *

Growth resistant cast iron, described in an article in the November, 1948 issue of THE FOUNDRY, by W. H. White, Jackson Iron & Steel Co., Jackson, O., and A. R. Elsea, Battelle Memorial Institute, Columbus, O., now is being produced commercially under the trade name "Jiscon." The castings are reported to be especially suitable for various applications, including nonferrous melting pots and molds, stove parts, etc. Production of the iron is being licensed on a royalty-free basis by the Jackson company.

* * *

Link-Belt Co., Chicago, has moved several of its offices into larger quarters. The Cleveland office, headed by Paul V. Wheeler, district manager, is now located at 314 Hanna Bldg. The Baltimore office has been moved to 2315 St. Paul St. Charles C. Wiley is district manager. The office in Huntington, W. Va., headed by David W. Stevens, is now at 1009 Fifth Ave. The Newark, N. J., office, of which John D. Riley is district manager, has been moved to 31 Clinton St.

* * *

J. Zellinger was recently successful bidder on the property and assets of the American Foundry & Casting Co., 2 Pacific Ave., Jersey City, N. J., which had been forced into receivership. Mr. Zellinger was the mortgagee and at present is affiliated with the National Foundry of New York Inc., Sanford St., Brooklyn, as sales manager. While operations may be resumed at the Jersey City plant, possibly under a different name, no definite decision on the part of the new owner was reported at the time this issue went to press.

* * *

Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia 44, manufacturers of electrical measuring instruments, automatic controls and heat treating furnaces, recently celebrated its 50th anniversary with a dinner, entertainment and dance for 3500 employees and guests, in Convention Hall. Morris E. Leeds, founder of the company and now chairman of its board of directors, was presented with a gold 50-year service placque and a bound testimonial expressing the organization's esteem for his work.

* * *

Rockwell Mfg. Co., 400 North Lexington Ave., Pittsburgh, has formed a Power Tool Division of the company. The new division, headed by Robert P. Melius, is located at 600 East Vienna Ave., Milwaukee 1. It will market the products of the Delta Mfg. Division, Milwaukee; Arcade Mfg. Division, Freeport, Ill.; Red Star Products Co., Norwalk, O., and Crescent Machine Division, Leetonia, O.

* * *

Dravo Corp., Pittsburgh, has appointed Clisby Associates Inc., 904 Sixth Ave. North, Birmingham, distributor in central and northern Alabama, for its line of counterflow heaters for industrial and commercial buildings. Clisby Associates, operated by Irwin Clisby and H. B. Hanson Jr., will also distribute Dravo crane cab coolers in Alabama and northwest Florida.

* * *

War Assets Administration has sold to American Brake Shoe Co., New York, a surplus, government-owned plant at 344 Vulcan St., Tonawanda, N. Y., operated during the war by Farrel-Binmingham Co., Ansonia, Conn. The plant, located on a

(*Concluded on page* 125)

NEW PLANT: A modern centrifugal cast iron pipe plant recently was completed by F. H. McGraw & Co., engineers and constructers, for Pacific States Cast Iron Pipe Co., Provo, Utah. The new plant consists of four mill-type structural steel frame buildings with galvanized corrugated iron roofing and siding and has a capacity of 100,000 tons yearly. The plant is equipped with five deLavaud pipe casting machines and two 96-in. cupolas. Pipe is heat treated continuously in the annealing furnace, and then rolls by gravity on skid rails through various finishing processes. Special equipment dips the pipe in a tar vat prior to shipment. Pipe is tested hydraulically under 500 psi on a special press

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Phone: Geneva 6337

MIDWEST FOUNDRY SUPPLY CO.,
3430 Brighton Blvd., Denver 5, Colo.
Phone: Tabor 8680

SOUTHWEST FOUNDRY SUPPLY CO.,
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Name ..... Title .....

Company ..... Address .....

THE AMERICAN SILICA SAND COMPANY

Producers of Dried and Crude Silica Sands

OTTAWA, ILLINOIS

(*Concluded from page* 122)

12-acre plot, has nearly 150,000 sq ft of floor space. It will be operated by the Ramapo Ajax Division of American Brake Shoe Co., which will transfer certain operations from its Hillburn and Niagara Falls, N. Y., plants. American Brake Shoe Co. has closed the foundry of its Southern Wheel Division, located at Hemphill Ave. and Bishop St., Atlanta, which it has operated for 36 years. The company plans to sell the plant property and equipment. Customers will be served from other company plants throughout the country.

* * *

Thew Shovel Co., Lorain, O., manufacturers of power shovels and cranes, will celebrate its 50th anniversary as a corporation on July 17. Founded in 1895 by Capt. Richard P. Thew, captain of an ore-carrying lake boat, the company developed the first full revolving shovel. Incorporated in 1899 as the Thew Automatic Shovel Co., it later became the Thew Shovel Co. The company now operates 5 plants, 2 in Lorain, O., 2 in Elyria, O., and one in Bucyrus, O., with over 1500 employees.

* * *

Claude B. Schneible Co., Detroit, has appointed Russell F. Lincoln & Co., 1058 Maplecliffe Drive, Lakewood 7, O., as representative for northern Ohio. A. G. Hobson, 197 Clifton St., Malden, Mass., will represent the Schneible company in all of the New England states except Connecticut.

* * *

Automatic Transportation Co., Chicago, has appointed Conlan & Ayers Co., 1022 North Fourth St., Milwaukee, as representative in Wisconsin for its line of electric industrial trucks. Hugh Ayers is president of the newly organized company and Harry M. Conlan Jr., vice president and treasurer.

* * *

Ward Machine & Foundry Co., 540 Northwest Fifth St., Richmond, Ind., has opened a brass and aluminum foundry as an addition to its gray iron casting department. The nonferrous foundry is housed in a new building adjoining the original structure.

* * *

Leaman Welding & Machine Co., Lafayette, Ind., has added a foundry for the production of aluminum castings, under direction of Charles Leaman.

* * *

Linde Air Products Co., unit of Union Carbide & Carbon Corp., 30 East 42nd St., New York 17, has begun operations at its recently completed oxygen distributing and acetylene producing plant at Seventh Ave. North and 22nd St. North, Fargo, N. D.

* * *

Vapor Blast Mfg. Co., formerly of 333 South Sixteenth St., Milwaukee 3, has moved into its new, modern plant and general office at 3025 West Atkinson Ave., Milwaukee 9. Company manufactures liquid honing and wet sandblasting equipment.

* * *

Combined volume of shipments of ingot brass and bronze, as reported by the Ingot Brass & Bronze Industry, Chicago, was 9696 tons for June 1949, compared with 11,114 tons for May and 24,401 tons for June, 1948.

* * *

Wheelco Instruments Co., Chicago, manufacturers of industrial temperature controls and combustion safeguards, has appointed J. L. Highsmith & Co., 111 Corcoran St., Durham, N. C., as its representative in the state of North Carolina.

* * *

Rouston Foundry & Machine Shops Ltd., Alexandria, La., plans construction of an all-metal building at 1020 Bogan St., to cost $12,000. The company suffered $20,000 loss when its foundry building at 7 Bogan St., was destroyed by fire May 11.

* * *

Offices of Alar, a technical association of light alloy refiners in Great Britain, have been moved and the new address is: 3, Albemarle St., London, W. 1.

* * *

Bayside Iron Works Inc., City Dock, Everett, Wash., suffered extensive fire damage to its foundry May 9.

* * *

Markal Co., maker of Paintstiks for marking hot and cold castings, recently moved to new quarters at 3052 W. Carroll Ave., Chicago 12.

Film Shows Details of Foundry Operations

AN UNUSUALY detailed and clear description of foundry practice is provided in the motion picture, "Men and Molds," produced for the Lynchburg Foundry Co., Lynchburg, Va. The 37½-minute sound film is intended primarily as a training-type picture and for this reason includes considerable detail and explanation to acquaint a new employee with the various operations which enter into the making of castings. At the same time, sufficient general interest is incorporated to give the film value in sales and public relations.

The "cast" is composed entirely of members of the Lynchburg organization. A professional narrator furnishes running comment on the picture's action, and background music adds appropriate tonal effect.

The film was produced by Motion Picture Productions Inc., Rockefeller building, Cleveland, under the direction of Donald C. Jones.

Preparing to shoot a scene for Lynchburg Foundry Co.'s "Men and Molds"

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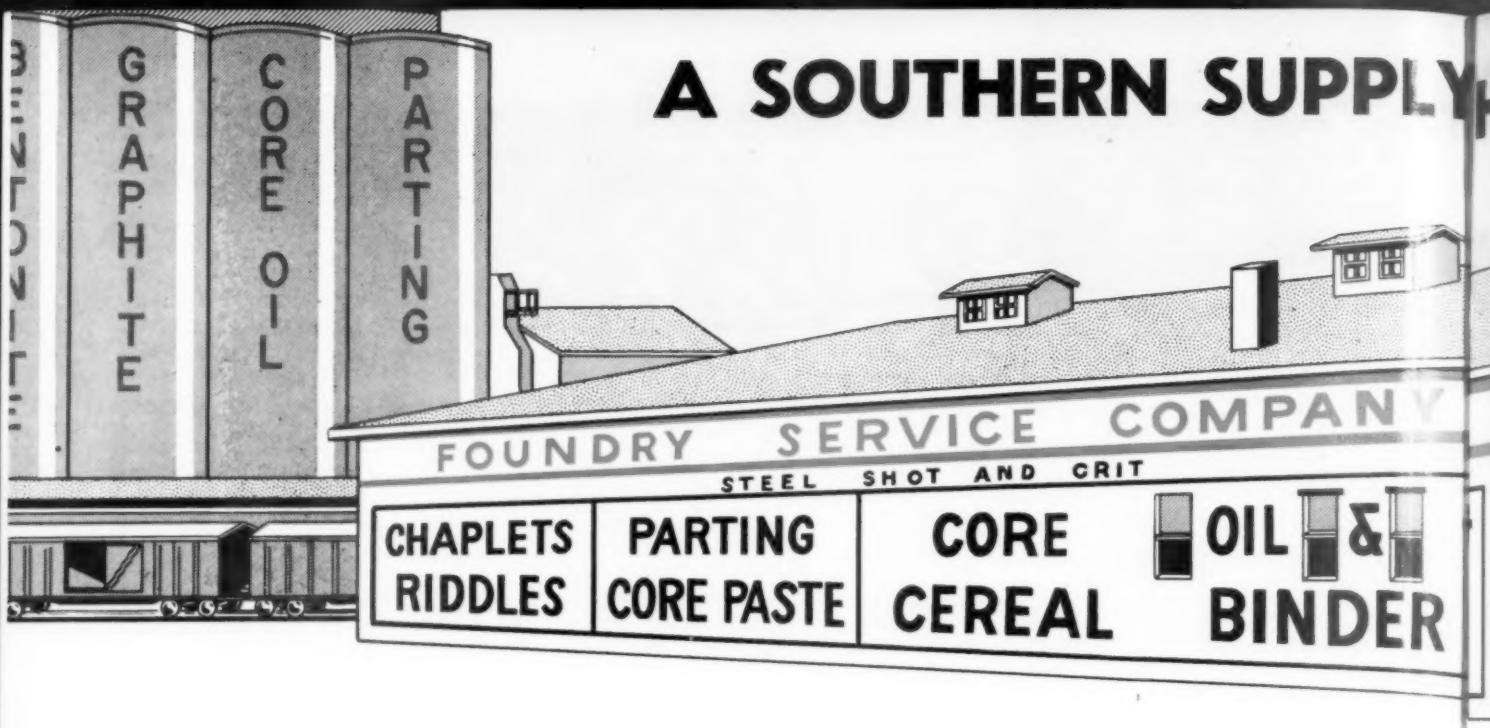

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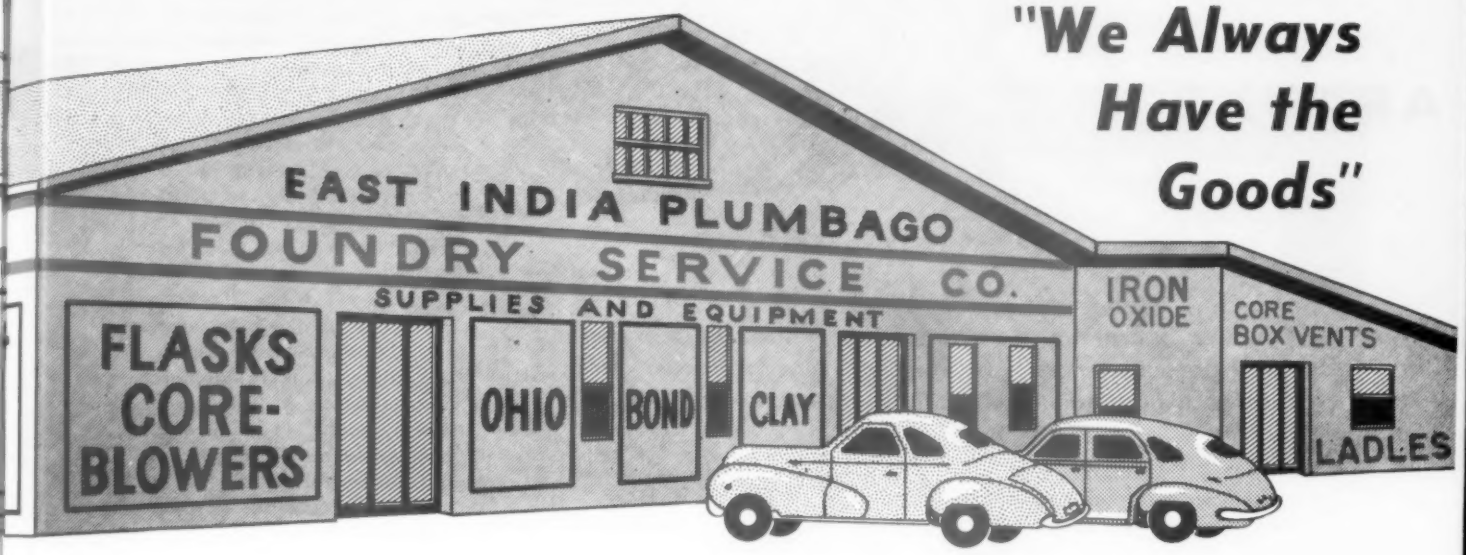

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By A. H. ALLEN
Detroit Editor
THE FOUNDRY

AROUND Detroit

Automotive operations sustained by continued heavy demand for new passenger cars. . . . Renewed buying of cast scrap in face of exhausted inventories stiffens market appreciably

SUSTAINED demand for new passenger cars has buoyed industry hopes for holding to a high level of production until well into the fall. August output figured to set a new postwar monthly record, and renewed buying of raw materials plus the lengthening of parts releases all are favorable factors. On the minus side, however, are the dangers of a possible steel strike and a tieup of Ford Motor Co. operations. Steel intake will be ample to sustain car and truck assemblies at least through September, whether there is a mill strike or not, and there is considerable opinion leading to the belief an agreement will be worked out in steel to avoid a shutdown.

The 6 to 1 vote of Ford employees in favor of a strike does not mean too much. Voting workers, totaling something like 75,000, had been told by the UAW-CIO that a vote in favor of a strike did not necessarily mean a strike but would simply reinforce its position at the bargaining table. This, plus the fact the polling was held just across the street from union headquarters, with the union supplying free transportation, sandwiches and entertainment, made the whole affair a trifle one-sided as far as providing any accurate gage of true sentiments was concerned.

Naturally, all the captive automotive foundries continue to pour out castings in record volume. Materials supplies are plentiful and quality continues to improve, with the result that scrap percentages in foundry are tending downward. At the same time there has been a reversal of the slow pace of independent and jobbing foundries, as attested to by a reawakening of interest in purchases of cast iron scrap. Ford Motor Co. has made at least two large buys of this material and the action seemed to touch off purchases by smaller operators. The result has been that cast scrap prices started upward from their $21-per-ton low, gaining $6 a ton or more early in August. Brokers were guessing the price might move on up to as much as $40 per ton before leveling off. Explanation seems to be that inventories of scrap have been completely cleaned and any degree of continued operation at all by foundries required additional buying. With scrap selling for $20 a ton less than pig iron there was no way it could go except up.

* * *

The long-heralded Buick Special made its bow early last month and is already in volume production at Flint plants and assembly plants on both coasts. Buick is figuring to build well over 50 per cent of its volume in this lowest-priced series and is expected to complete almost 40,000 of all three types in August, a new monthly high. Most distinctive feature of the Special, other than its completely new body design, is the front-end bumper-grille assembly. Mounted on the front bumper face are nine equispaced heavy-gage steel bumper guards which comprise the vertical elements of the grille, a die-cast trim ring being set into the front of the hood to frame the file of steel guards. The construction permits moving the hood well forward from previous designs and aids in decreasing the overall length of the car by 3½ inches at the same time the chassis is lengthened by ½-inch.

No significant changes have been made in the power plant, it continuing to be 110 horsepower with 6.3:1 compression ratio with conventional gearshift, and 120 horsepower with 6.9:1 compression ratio when the Dynaflow automatic transmission is specified. Frontal area of the radiator is increased from 419 to 484 square inches when using the automatic transmission.

Improved insulation and cooling has been provided, although Buick engineers insist there is no more heat involved with the Dynaflow than with conventional transmissions. The distinctive fender ventiports introduced on 1949 models to provide more air into the engine compartment have been redesigned into three rounded slots and relocated onto the side of the hood. Opening latch on the hood, incidentally, is positioned into one of these ventiports and is controlled by a small steel lever or key carried in the driver's compartment.

In view of the likelihood of increased schedules being necessary for the Dynaflow transmission, since it is standard on Roadmaster models and optional on Super and Special series, tooling is being completed on permanent molds for casting the turbine and other torque-converter elements of the unit. In the early stages, these parts were cast in plaster molds, then changed to sand molds, and now will be semi-permanent mold cast; that is, sand cores will have to be positioned in the cast iron outer molds. Castings are furnished by the Bedford, Ind., foundry of Allison Division.

* * *

There has been some sort of temporary hold-up on production of the Packard Ultramatic torque-converter transmission, which also uses cast aluminum rotor elements. Exact details have not been revealed, except that engineering changes are involved. Aluminum Co. of America furnishes castings for these units.

Difficulties with the production of sound engine block and head castings in the period immediately following the war now are history. Lack of uniform quality in raw materials, pressure on production, and supply shortages all contributed to high scrap and also to the release of some castings for production which normally might never have been allowed to get by.

Another August newcomer to the passenger car ranks was the Studebaker 1950 model group, featuring startling new front-end styling treatment comprising an airplane fuselage-type hood, flanked by air-foil front fenders, set off by a central chrome-plated "spinner" in the hood front, similar to but larger than the Ford grille "spinner." Below and adjacent to this unusual ornamentation are four frontal openings for engine cooling air. Largest of these are two oval-shaped honeycomb grille scoops below two smaller air channels which flanked the spinner. Bright metal moldings frame these two smaller channels.

Unusual feature of the coil front

(*Concluded on page* 130)

FERRO-SILICON BRIQUETTES

Tepco Ferro-Silicon Briquettes, used mainly for the addition of silicon to the cupola charge of iron foundries, are most convenient because they contain a certain definite weight and can be counted instead of weighed. At the same time, the briquettes are more valuable than lump ferro-silicon because the binder in the briquettes protects the ferro-silicon as it is melted in the cupola and a greater return of silico
by that means.

Tepco Ferro-Silicon Briquettes are produced at our Chattanooga plant (formerly Southern Ferro-Alloys Company, Chattanooga, Tennessee). The 2½-pound briquettes contain one pound of silicon and the 5-pound briquettes contain two pounds of silicon.
Tepco Ferro-Silicon is also available in all sizes from lump through 150 mesh by down, packaged or in bulk—50%, 65% and

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GENERA
PLANTS A

MILLER & CO., Chicago, St. L
EXPORT

(*Concluded from page* 128)

spring suspension is the pivoting of both upper and lower control arms so that they rake to the rear about 15 degrees. This has the effect of cushioning the ride on rough roads since the front wheels "travel away" from a bump as the car passes over it. Rubber insulation is used at the top and bottom of each coil spring. Engine compression ratio has been raised to 7:1.

Lists Radioactive Material Uses

Arthur D. Little Inc., Cambridge 42, Mass., has prepared a 24-page booklet, "A Selected Bibliography on the Industrial Uses of Radioactive Materials." Atomic tracing or detecting and utilization of radioisotopes as compact portable sources of radiation, the two main fields of industrial use of radioactive isotopes, are explained. General background references are listed as well as survey articles of industrial application. References dealing with specific fields include the following: Petroleum, Mining and Metallurgy, Textiles, Instruments, Radiography, Analysis, Pharmaceutical, Glass Radioisotope Preparation and Miscellaneous Industrial Applications. Copies of the bibliography are available without charge.

New Steel Castings Booklet Offered

Design advantages, economy and dependability of steel castings are emphasized in a new 34-page booklet, "The Steel Castings Industry," published recently by the Steel Founders' Society of America. It provides a brief history of the significant role the steel casting industry has played in building of the nation's industrial facilities and points to the ever-increasing number of industries making use of steel castings to improve products and cut production costs.

Considerable space is devoted to word and picture descriptions of steel castings used to solve specific problems and meet critical, general requirements of various industries, including motor vehicles, construction equipment, rolling mills and blast furnaces, metalworking equipment, machines and tools, etc. Another section is devoted to a detailed report on the comprehensive co-operative research program developed through the years by the Steel Founders' Society of America. An envelope folder enclosed with the booklet incorporates a new tabulation of the general engineering types of steel castings, classified according to tensile strengths.

Copies of the booklet may be obtained by request to F. Kermit Donaldson, executive vice president, Steel Founders' Society of America, 920 Midland Bldg., Cleveland 15.

Shifts Management

Management of aluminum activities within Federated Metals Division, American Smelting & Refining Co., has been reorganized and executive offices moved from the Fisher Bldg., Detroit, to the company's home office, 120 Broadway, New York. R. A. Quadt, formerly assistant manager of the General Aluminum Department, has been appointed director of aluminum development under John A. West, manager of technical operations. Mr. Quadt will assume most of the directive functions formerly held by J. B. Neiman, manager of the General Aluminum Department until his recent resignation. Mr. Quadt has spent a number of years in aluminum research under direction of Dr. A. J. Phillips, director of research for American Smelting & Refining Co., and will continue this activity.

Prize-Winning Ad

An advertisement of the Federated Metals Division, American Smelting & Refining Co., was the basis for a first prize awarded the John Mather Lupton Co., New York, in the annual competition of the Affiliated Advertising Agencies Network. The advertisement appeared in the June, 1947 issue of THE FOUNDRY. This was one of six awards in various categories received by the Lupton company in this competition and one conducted by the National Industrial Advertisers Association.

Metal Guild Meets

Electrical Metal Makers Guild has announced the following officers for the coming year: President, F. O. Lemmon, Ohio Steel Foundry Co., Springfield, O.; vice president, E. J. Chelius, Carnegie-Illinois Steel Co. Duquesne, Pa.; secretary-treasurer R. J. McCurdy, Republic Steel Corp. South Chicago, Ill.

Size of Machine	Size of Roll-Over Plate		Length of Pattern Board when using Flask Clamps		Height Plate from Floor	Max. Space for Overall Depth of Flask, Pattern Board and Bottom Board	Draw	Capacity
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Available only in Plain Jar and Stationary Type.

Air-operated Flask Clamps, as shown, furnished at slight additional cost.

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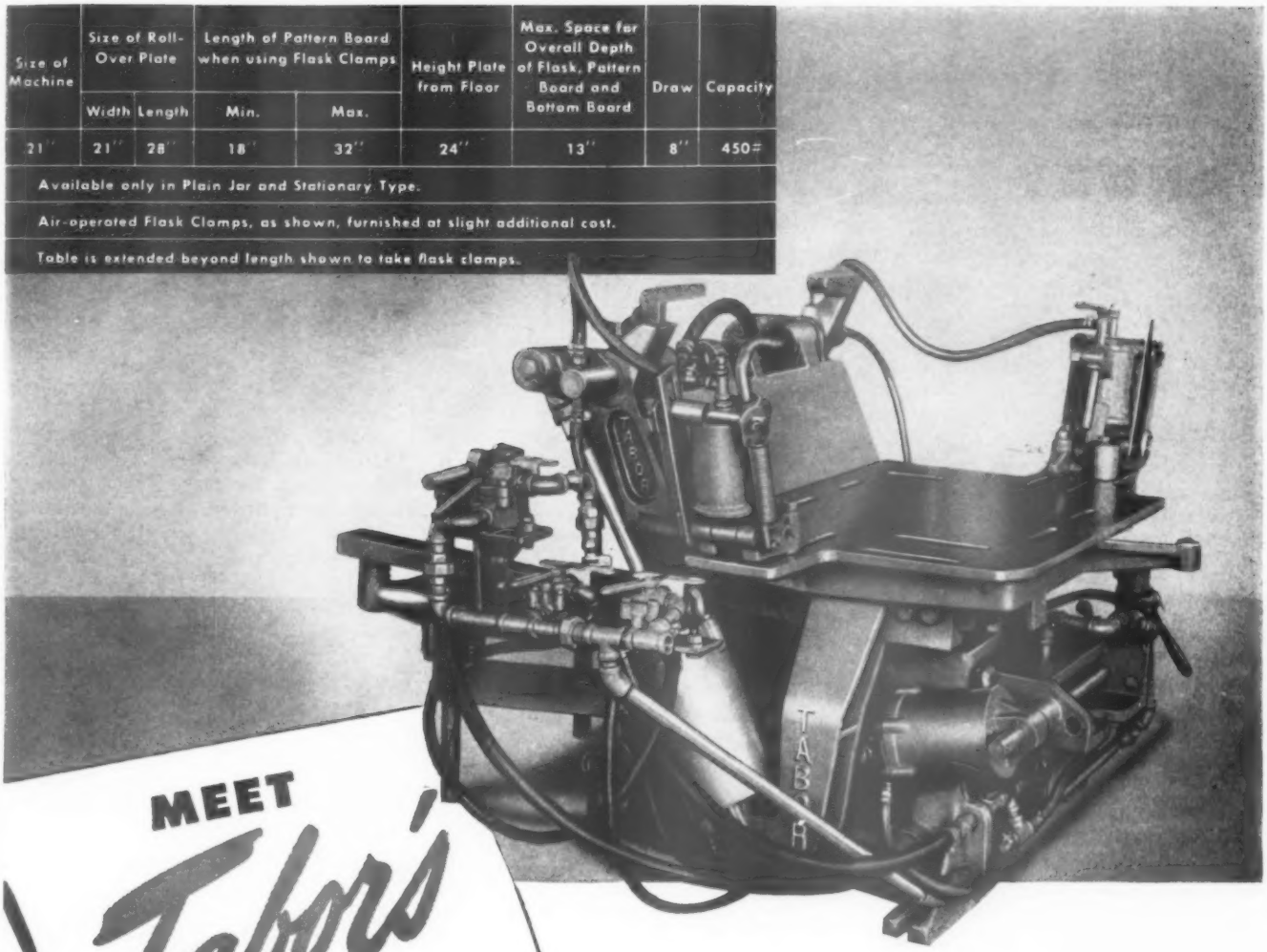

MEET Tabor's NEW ROLLOVER ...small and completely power-operated

Tabor, foremost name in foundry molding machines, shows the way again—to completely power-operated production of small or medium-sized molds and cores.

It's wrapped up in a rugged, well-designed machine—our new 21" Rollover. Air-operated clamps grip the flask. A powerful cylinder Jar-Rams the mold. Rollover and drawing operations are power controlled. Air-operated leveling device insures a perfect, right-angle draw.

No foundryman can afford not to utilize the advantages—in upped production, in reduced operator fatigue—made possible by this machine. It's described fully in the new Rollover Bulletin No. 494—just off the press. Write for your copy. And if you need further details or assistance, you'll find Tabor on the job.

REPRESENTATIVES
Snyder Foundry Supply Company, Los Angeles, Calif.; The Pacific Graphite Company, Inc., 40th & Linden Sts., Oakland 8, Calif.; Carl F. Miller & Company, Seattle, Washington; M. W. Warren Coke Company, 1017 Olive Street, St. Louis 1, Mo.; E. R. Frost Company, Inc., Minneapolis 14, Minn.; Harry H. Reich, Trussville, Ala.

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By EDWIN BREMER

FOUNDRY Developments

CLAIMED to be revolutionary and new, Ford Motor Co. has developed an etching process to prepare metal surfaces for microscopic examination and photography. Known as cathodic vacuum etching, the method utilizes ionized atoms as the etching agent. Procedure is to place the metal sample under a bell jar, and evacuate the air. Some argon then is admitted and it is ionized by an electrical discharge at 12,000 volts potential between the specimen and an electrode mounted above it. Argon ions bombard the specimen surface, removing minute particles. This is said to show the microstructure with greater detail and clarity than is possible with the usual chemical etching treatments.

* * *

RECORDING torque magnometer has been designed by Donald S. Miller, Research Laboratory, U. S. Steel Corp. of Delaware, which can determine the magnetic directional properties of steel in six minutes. Knowledge of these properties is important since, in steels for deep drawing, those with little magnetic directional properties are desired. For cores in electrical transformers, steels with strong magnetic directional properties are preferred, but minimal directional properties are wanted in steels for construction of electric motors and generators.

* * *

RAT-TAIL casting defects, according to the AFS Committee on Physical Properties of Iron Foundry Molding Materials at Elevated Temperatures, results when both hot compressive strength and confined expansion are high. Lowering either will alleviate the problem, but in practice it is easier to change hot compressive strength than confined expansion. Best laboratory tests to determine tendency toward rat-tailing are hot compressive strength at 1100° F and confined expansion at 1500° F. Increasing coarseness of the sand is helpful, since it gives greater latitude in the control of mold hardness, hot compressive strength, and confined expansion. Use of cushioning materials such as wood flour, cereal, bran, etc., offers a means for reducing or eliminating rat-tails. For gray iron plate castings a hot compressive strength at 1100° F within the range of 50 to 80 psi having confined expansion at 1500° F as low as possible, preferably below 0.030-in. per in. of length, is suggested.

* * *

PACIFIC coast nonferrous foundry using open-flame gas-fired furnace had considerable trouble with excessive slag build-up when the flame was adjusted to provide 0.5 per cent oxygen. When a slight excess of gas was employed the slag became fluid and could be removed easily. However, the metal became gassy. Copper oxide first was used to remove the hydrogen, and later experiments with compressed air led to its adoption as the degasifying agent. Time of application varies from 15 to 90 seconds. Air is not dried, but entrained moisture is removed from the compressed air in a receiver placed at the take off.

* * *

REPORT of the Sand Casting Committee, Aluminum and Magnesium Division, AFS, on fluxing of aluminum alloys states that chlorine gas is used primarily for alloys containing high magnesium content, and some of the magnesium is lost during the operation. Chlorine should not be used in aluminum alloys modified with sodium, because it effectively reduces the sodium content. Aluminum alloys high in magnesium should not be fluxed with sodium containing fluxes, since the latter tend to put sodium into the melt with detrimental effect on physical properties. Sodium-silico-fluoride is not recommended for use today as it tends to give off toxic fumes. Also it reacts exothermically with aluminum, and causes some sodium to enter the metal.

Cathodic vacuum etching method being applied to a specimen by Don W. McCutcheon, applied physics research department, Ford Motor Co., Dearborn, Mich.

* * *

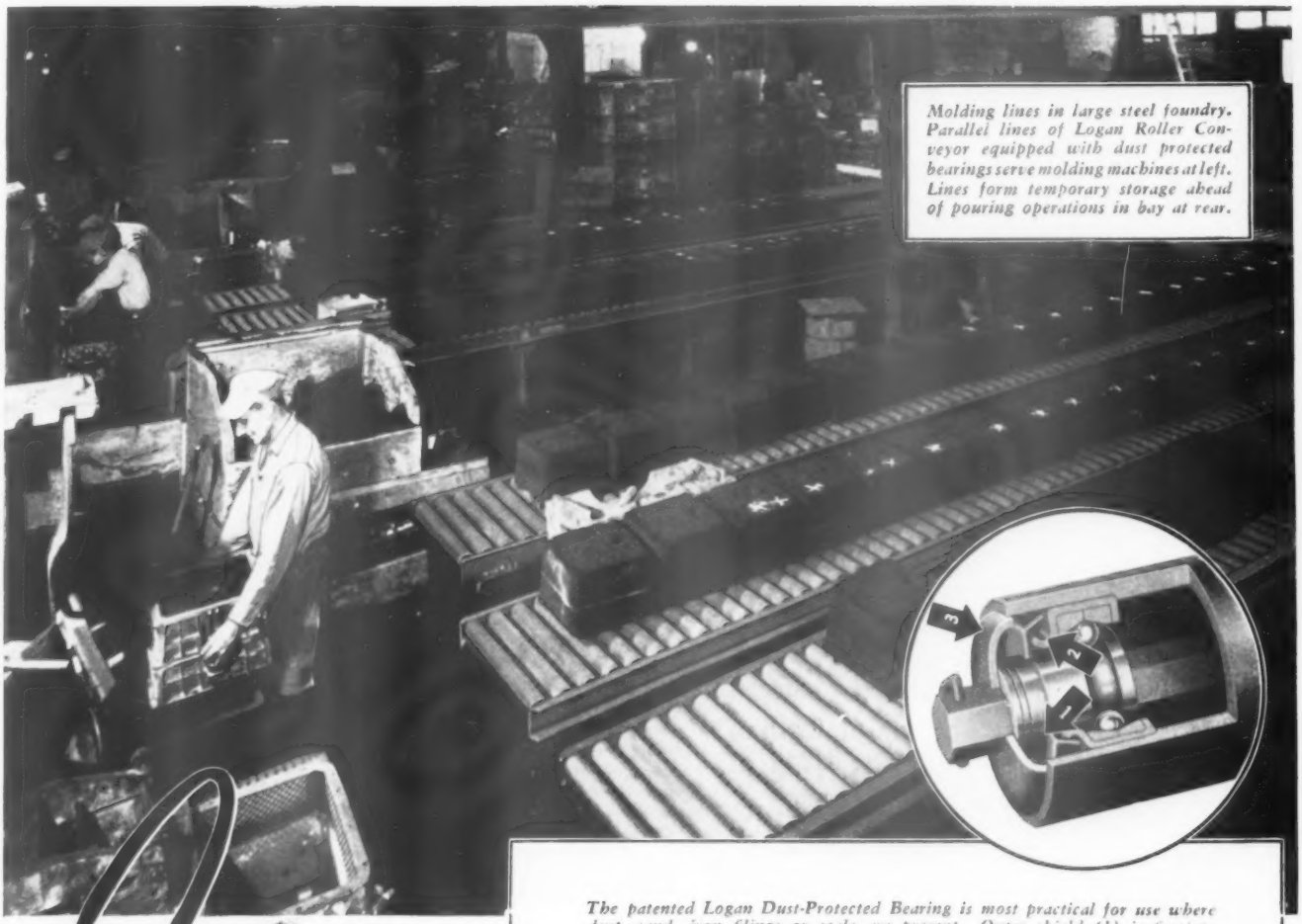
STUDY of the effect of boron additions to cast iron by A. I. Krynitsky and Harry Stern, National Bureau of Standards, as reported in *Journal of Research*, National Bureau of Standards, and also in a paper presented at the recent AFS annual convention, shows in general that boron increases the depth of chill as well as its hardness. Boron also was found to decrease the size and quantity of graphite particles, to increase the free carbide content, and to produce an undercooling effect which becomes more pronounced with greater percentages of boron.

* * *

BRITISH foundry producing a paraboloid-shape aluminum casting 36-in. diam, 27 in. long, ¼-in. wall thickness and weighing 70 lb, turned from sand casting to permanent mold casting when demand increased. Advantages found were that production increased from four to six castings per shift to 65; cost of cleaning was reduced as less gates and risers were required; reproduction of paraboloid form was secured without risk of distortion; there was freedom from inclusions and blowholes, and a smooth surface was produced.

* * *

ON a production job where the corebOxes were changed to magnesium alloy it was found that 12 per cent more cores were produced in an 8-hr shift. Time study indicated that the greatest difference was in the closing two hours of the shift when 46 per cent more cores were made in magnesium coreboxes.



Molding lines in large steel foundry. Parallel lines of Logan Roller Conveyor equipped with dust protected bearings serve molding machines at left. Lines form temporary storage ahead of pouring operations in bay at rear.

The patented Logan Dust-Protected Bearing is most practical for use where dust, sand, iron filings or scale are present. Outer shield (1) is fixed to stationary inner race of bearing; does not touch any rotating part. Steel labyrinth seal (2) repels dust as roll revolves. The shot shield (3) is recommended for pouring zones. Rounded shape sheds splashed metal—prevents fouling. The shot shield remains stationary and has clean-out opening at bottom. Entire bearing assembly is set back from end of roll in protected position, revolves just as freely as a plain bearing because it has no felt washers.

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● "We look upon our Dustube Dust Collectors as a profitable investment instead of a necessary evil. Foundry dust is not only expensive but also troublesome—a source of discontent and irritation. We are proud of our dust-free working conditions and much of the credit must be given to the efficient operation of the Dustube Dust Collectors. In these days when costs are so closely watched, the economy of the collectors is especially gratifying."

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ETCHANTS FOR MICROEXAMINATION OF CAST MAGNESIUM ALLOYS

Etchant No.	Composition		Etching Procedure	Characteristics and Uses
1	*5% picral Distilled water Glacial acetic acid	50 ml 20 ml 20 ml	Immerse face up with gentle agitation exactly 15 sec. Wash in running alcohol and dry in gentle stream of air.	Shows trace of basal plane. Sensitive to solid solution composition. Dintinguishes between microshrinkage and fusion voids. Reveals temperature of aging.
2	*5% picral Distillated water Glacial acetic acid	50 ml 20 ml 16 ml	Same as above.	Same as above except different range of solid solution composition.
3	*5% picral Distillated water Glacial acetic acid	100 ml 10 ml 5 ml	Same as above except time of etching not critical.	Reveals grain boundaries in as-cast metal. Stains grains of various orientation differently. Very sensitive in revealing distortion.
4	*5% picral Distillated water	50 ml 50 ml	Immerse face up for 30 sec, wash in running alcohol and dry in stream of air.	Greater contrast between Mg_2Si compound and Mn. Mg_2Si is brilliant blue. Mn is dull gray.
5	Hydrofluoric acid (48%) Distilled water	10 ml 90 ml	Immerse face up for 1 to 2 sec, wash in water, then alcohol and dry.	Darkens $Mg_{17}Al_{12}$ compound and leaves $Mg_2Al_2Zn_3$ ternary compound unetched and white.
6	*5% picral Distilled water	10 ml 90 ml	Immerse face up for 15 to 30 sec, wash in alcohol and dry.	Used after HF etchant to darken matrix to give better contrast between matrix and white ternary compound.
7	*5% picral Distilled water	100 ml 10 ml	Immerse face up for 15 to 30 sec, wash in alcohol and dry.	Gives good contrast between types of precipitate.
8	*5% picral Orthophosphoric acid	100 ml 0.7 ml	Immerse specimen face up for about 10 to 20 sec or until the polished surface is darkened. Wash with alcohol and dry.	For estimating the amount of massive compound. Stains matrix and leaves compound white.
9	Ethylene glycol Distilled water Conc. nitric acid	75 ml 24 ml 1 ml	Immerse specimen face up with gentle agitation for 3 to 5 sec for as-cast or aged metal. Up to 1 min for HT metal. Wash with water, then alcohol and dry.	Shows general structure.
10	Ethylene glycol Glacial acetic acid Distilled water Conc. nitric acid	60 ml 20 ml 19 ml 1 ml	Immerse specimen face up with gentle agitation for 1 to 3 sec for as-cast or aged metal, 10 sec for HT metal. Wash with water, then alcohol and dry.	Show general structure. Grain boundaries in HT castings.

*5% picral contains 5 grams picric acid dissolved in ethanol to make 100 ml. Picral can be made in advance and used as stock solution.

From a paper presented by P. F. George, Dow Chemical Co., Midland, Mich., at the annual convention of the American Foundrymen's Society.

MISCELLANEOUS INFORMATION FOR THE PATTERNMAKER'S NOTEBOOK

Frequently pipe connections are made to castings and the patternmaker has to figure on cores of proper size to admit the pipe. The finished diameters of the cored holes for various sizes of pipe are given, with other information, in the pipe table below. The table of wood screw data shows the size drills to use in drilling patterns for screws of various sizes. The sizes of drills less than ¼-inch diameter are given in Brown & Sharpe wire gage numbers. The fillet table gives the principal dimensions of leather fillets.

WROUGHT IRON PIPE DATA

Size, inches	⅛	¼	⅜	½	¾	1	1¼	1½	2
Actual external diam.	0.405	0.54	0.675	0.84	1.05	1.32	1.66	1.90	2.38
Actual internal dia.	0.27	0.364	0.494	0.623	0.824	1.05	1.38	1.61	2.07
No. of threads	27	18	18	14	14	11½	11½	11½	8
Size of tap drill. (Cored holes must be finished to this diameter)	21–64	29–64	19/64	23/64	15/32	1 7/8	1 15/32	1 31/32	2 3/16
Size, inches	2½	3	3½	4	4½	5	6	7	8
Actual external diam.	2.88	3.5	4	4.5	5	5.56	6.63	7.63	8.63
Actual internal diam.	2.47	3.07	3.54	4.03	4.51	5.04	6.07	7.023	7.982
No. of threads	8	8	8	8	8	8	8	8	8
Size of tap drill. (Cored holes must be finished to this diameter)	2 5/8	3¼	3 5/8	4¼	4¾	5 5/16	6 5/16	7⅜	8⅜

WOOD SCREW DATA

No. of screw	20	18	16	14	12	10	9	8	7	6	5	4	3	2
Drill for body	1/4	3/16	11/64	11/64	2	10	17	19	26	28	30	36	39	44
Drill for threads	13/64	1	6	12	19	23	26	29	33	37	41	44	47	50

DATA ON LEATHER FILLETS

No.	1	2	3	4	5	6	8	10	12	14	16
Size or radius	1/16	1/8	3/16	1/4	5/16	3/8	1/2	5/8	3/4	7/8	1
Width of face	3/16	1/4	5/16	3/8	1/2	5/8	3/4	1 1/16	1 5/16	1 9/16	1 7/8

To Find the Length of a Chord to Divide the Circumference of a Circle Into N Equal Parts, Multiply S by the Diameter

N	S	N	S	N	S	N	S
1		26	.12054	51	.061560	76	.041325
2		27	.11609	52	.060379	77	.040788
3	.86603	28	.11197	53	.059240	78	.040267
4	.70711	29	.10812	54	.058145	79	.039757
5	.58779	30	.10453	55	.057090	80	.039260
6	.50000	31	.10117	56	.056071	81	.038775
7	.43388	32	.098018	57	.055089	82	.038303
8	.38268	33	.095056	58	.054139	83	.037841
9	.34202	34	.092269	59	.053222	84	.037391
10	.30902	35	.089640	60	.052336	85	.036953
11	.28173	36	.087156	61	.051478	86	.036522
12	.25882	37	.084804	62	.050649	87	.036103
13	.23932	38	.082580	63	.049845	88	.035692
14	.22252	39	.080466	64	.049068	89	.035291
15	.20791	40	.078460	65	.048312	90	.034899
16	.19509	41	.076549	66	.047582	91	.034516
17	.18375	42	.074731	67	.046872	92	.034141
18	.17365	43	.072995	68	.046184	93	.033774
19	.16460	44	.071339	69	.045515	94	.033415
20	.15643	45	.069756	70	.044865	95	.033064
21	.14904	46	.068243	71	.044232	96	.032719
22	.14232	47	.066793	72	.043619	97	.032381
23	.13617	48	.065401	73	.043022	98	.032051
24	.13053	49	.064073	74	.042441	99	.031728
25	.12533	50	.062791	75	.041875	100	.031411

Who's Who...

YOUR FOUNDRY PROSPECTS AND CUSTOMERS

- Names and Addresses of All Foundries
- Type and Number of Melting Units
- Capacity of Melting Units
- Type of Metal Melted
- Departments Operated

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Gray Iron	3289	Aluminum	3083
Steel	406	Magnesium	151
Malleable	154	Permanent Mold	575
Nonferrous	3576	Centrifugal Casting	213
Exclusive	2292	Machine Shops	3289
Departments	1284	Pattern Shops	3934
Brass and Bronze	2835	Laboratories	1564

This well-known directory is just off the press and is now available for delivery. Order your copy today, so that you can check against your own records, search out new prospects, and plan your sales effort in this important market. The price complete is $50.00—less than 1c a foundry!

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READERS' COMMENT • • •

Permanent Mold Material

TO THE EDITOR:

In a recent issue of your magazine, there is a question asked by one of your readers under the head, "Permanent Mold Not Successful." This question was sent from a man in Australia who is trying to establish a section for production of brass castings by the permanent mold process.

I believe it would be helpful if you would suggest to this man that he try the use of the electric furnace graphite as a permanent mold material. I think he will be very definitely surprised at the excellent results received from this material.

Thickness of the graphite mold is a very important factor in establishing the rate of chill and this man should secure a few small pieces and carry on his own experimental work to arrive at satisfactory mold dimensions for this particular job.

Using electric furnace graphite as a permanent mold material obviates the necessity of using mold washes of any sort.

V. J. NOLAN
Assistant General Sales Manager
National Carbon Co. Inc.
30 East 42nd St.
New York 17, N. Y.

* * *

Carbon Determination Methods

TO THE EDITORS:

A recent paper by Roy E. Deas and Lilian T. Conradi (THE FOUNDRY, July, 1949, p. 68) describes methods of sampling coarse graphite materials for the accurate determination of total carbon using drillings. While we agree that the technique described provides fairly accurate means of determining total carbon, we think that the use of solid samples of cast iron provides a more satisfactory method of determination.

A procedure involving the use of solid specimens was developed at the British Cast Iron Research Association for the examination of cast irons having high carbon contents or very coarse graphite structures such as are encountered in ingot molds and sugar mill rolls. A report of this investigation will be published in the *BCIRA Journal of Research and Development*, Vol. 3, No. 1, in August, 1949.

It is important to bear in mind that castings which show coarse graphite structures generally also exhibit a considerable degree of heterogeneity so that the result obtained is representative only of the carbon content of the point from which the sample was taken and does not necessarily represent the average composition of the casting. Hence, in interpreting the results obtained, the position from which the sample was taken must be known.

In some materials the graphite flakes may be as much as 0.2 in. long, so that it is necessary to use fairly large samples to avoid the effect of heterogeneity. We have found that pieces approximately 2 x ⅛ x ⅛ in. are satisfactory for this purpose. To prevent loss of graphite from the surface of the specimen during preparation, the specimens are prepared as for a micro examination, that is, by rubbing down on successively finer grades of emery paper.

When burning off such large solid samples, a number of practical difficulties are encountered due to the large amount of heat generated. We have found that the most satisfactory way to overcome these difficulties is to use a large-diameter combustion tube having an internal diameter of approximately 1½ to 2 in. To obtain complete combustion of the sample we found it desirable to preheat for approximately 5 minutes in a combustion tube at 2000° F before passing the oxygen over the sample. After this preheating, combustion for 20 minutes in a rapid stream of oxygen (400 ml per minute) generally brings about complete fusion of the sample and all the carbon is evolved as carbon dioxide. The preheating also reduces the tendency to the formation of clouds of iron oxide.

An alternative method of treating solid samples is that of chemical removal of the major part of the iron by means of solution of copper potassium chloride. The carbonaceous residue left after treatment for several days can be filtered on asbestos and treated in the ordinary combustion apparatus.

W. WESTWOOD
British Cast Iron Research Association
Bordesley Hall
Alvechurch
Birmingham, England

* * *

"... and a Good Place to Have Work Done"

BECAUSE all of us like to hear good things about ourselves, we at Lebanon were pleased to read the enclosed advertisement in the magazine FOUNDRY.

We are proud that Herman Pneumatic Machine Company has picked out our foundry as "A good place to work." We like the emphasis which they place on the cleanliness of our foundry, on its good lighting, and its modern equipment.

We believe that a plant which is "A good place to work" is also "A good place to have work done." That is why we believe that you will find the reprint of the FOUNDRY advertisement interesting.

LEBANON STEEL FOUNDRY
Lebanon, Pennsylvania
"In the Lebanon Valley"

Lebanon Steel Foundry, Lebanon, Pa., recently made effective use of an advertisement for Herman Pneumatic Machine Co. in which the former's plant was featured. The leaflet reproduced above, attached to copies of the advertisement, emphasized to casting users that good working conditions promote production of good castings.

The Hard Way to Success

TO THE EDITORS:

I have read with interest a number of articles in THE FOUNDRY. These articles maintain that "The foundry is a good place to work." I am in complete agreement with this statement. Also a few articles have appeared telling of the various programs outlined for graduate engineers. For my own selfish reasons I would like to know what is being done about the man who has been striving for success the hard way, without the benefit of college training?

If I may, I would like to outline briefly my point. While in high school I began my foundry career in a brass foundry as melter, coremaker, and general helper. After high school, I started in an iron foundry working for my father. Dad proceeded to throw the book at me for several years; molding, coremaking, cupola, the whole works. At the same time I completed business college at night. I also studied all the foundry books I could get my hands on, and still do.

After bumming around the country awhile, I got my first foreman's job in a small iron and brass foundry in Amarillo, Tex. A short tour of duty with the Marine Corps left me jobless. In a short time I obtained my present position as iron foundry superintendent with a crew

(*Concluded on page* 140)

Shop ahoy!

. . . and if your shop is a foundry —ahoy again! For we're on the lookout for foundries—foundries that haven't tried ANNEALSHOT. We'd like to steer them on to this more efficient, more economical shot.

So ahoy there! If you're not already using ANNEALSHOT, come aboard and find out for yourself what this fine shot can do for you. Why not send in a trial order today!

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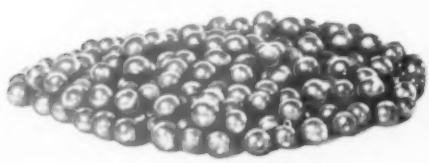


ANNEALSHOT is uniformly round, solid shot —no rough edges, no "tails", no hollow shot.

ANNEALSHOT by Metal Blast

(*Concluded from page* 138)

of about 55. I've held this position for three years. The castings are used on pipeline equipment. I feel I can make machinery and pressure tight castings with the best of them. During this time I've put in two years of college at night.

This whole things leads up to one thing. I'm arriving at my thirty-second birthday, I have a wife and two young sons and feel I should be moving on up the ladder. How is this done, by luck? I'm as far as I can go with my present connections.

Any consideration given this letter will be appreciated.

A READER

Technical Reports—IBF Meeting

Concluding reports on papers presented at technical sessions of the 46th annual meeting of the Institute of British Foundrymen, June 16-17, are detailed here. Other papers read before the meeting were discussed in the July issue.

By VINCENT DELPORT
European Manager
THE FOUNDRY

EXAMPLES of Aluminum Alloy Foundry Practice," by J. Vaven and H. W. Keeble.

The paper opens with a reference to the rapid development of the aluminum alloy foundry industry and outlines basic features of the various production methods normally employed. Part II indicates the more important technical features of aluminum alloy practice which influence the production of sound castings. In Part III production techniques for different castings as followed in a certain jobbing foundry are described. These techniques describe the way in which jobbing or semi-jobbing quantities may be handled on a self-contained sand molding machine circuit, the production and heat treatment of large diesel engine piston castings, making a large paraboloid-shaped casting by the gravity die method, and a special purpose die casting made with a sand core.

"Some Notable Aluminum Alloy Castings," by A. R. Martin, chief metallurgist, Northern Aluminium Co. Ltd., Birmingham.

This paper is divided into three sections: (1) A description of two types of intricate, high-strength alloy sand castings. (2) Examples of intricate gravity die castings. (3) Examples of finned, air-cooled cylinder head castings, one cast in sand and the other gravity die cast in an evacuated die. The castings illustrate not only the specialized technique and metallurgical control necessary for the production of castings in the high strength aluminum alloys, but, where possible, points of interest relating to die design and the construction of pattern and corebox equipment.

"Experiences with Ethyl Silicate in the Foundry," by D. F. B. Tedds, foundry metallurgist, the Bristol Aeroplane Co.

The paper describes the usefulness of ethyl silicate in a number of foundry applications. A brief outline of the precision investment casting process is discussed, and some of the defects encountered during molding are enumerated. The use of ethyl silicate for such ancillary applications as furnace linings, refractory shapes, washes, etc., is given. Finally, a method of coremaking is suggested which has a limited scope for small or medium sized cores, its greatest advantage being that it eliminates the use of compounds which generate large quantities of gas.

"Problems in Bronze Foundry Practice," by Dr. Austen J. Smith, associate professor of metallurgical engineering, Michigan State College, East Lansing, Mich. This was the exchange paper contributed by the American Foundrymen's Society.

The author's intention was to review some of the problems in bronze foundry practice for which foundrymen do not yet have an answer, and to touch on some of the work that is going on in the United States. Five main points were dealt with: (1) The mechanism of the freezing process; (2) contraction characteristics; (3) external influences; (4) effects of lead, and (5) drossing.

In dealing with the first two points, the author discussed them in relation to the problem of feeding of castings. In discussing external influences, he said: "A major problem confronting metallurgists and foundrymen is that no good method has been developed for determining gas contents, either of a melt or of a casting of the copper-base alloys. Thus far, the only study that has been possible to make of the effects of the gases has been by subjecting melts to the atmospheres of interest and assuming full solution, whatever the solubility may be. Development of an analytical procedure would be of the greatest interest in studying these problems."

In his conclusion, the author stated that he had endeavored to point out what is *not* known rather than what *is* known.

The discussion on this paper centered mainly on the question of pinholes appearing near the surface of the casting. One explanation given was that these may be due to undercooling, but some doubts were expressed whether, in some cases, there was undercooling. One speaker pointed out that the author had referred to pinholes in the neighborhood of the core, and not of the mold. Various suggestions were advanced, but no definite conclusions were arrived at.

Referring to the author's remark whether it is possible from present knowledge to design any casting which would be representative of the metal in the pot as the mold is poured, one speaker said that he found no difficulty in having a test bar representative of the metal in the pot, but the bar had to be cast with all possible precautions.

The statement was made that foundrymen are more concerned with various visible defects than with microporosity; in fact, it was said that measures taken to avoid microporosity sometimes caused real porosity. It was also said that aluminum alloys present very much the same difficulties as bronze, and to a large extent the conclusions in regard to aluminum are the same as those arrived at in the paper.

With regard to dross, it was stated that the best way to keep it out is to use traps, and it was pointed out that a subcommittee of the Technical Council of the IBF is studying the sizes of gates and risers, and that their conclusions may have an effect on the problem. It was said that bottom pouring could be effected without turbulence by pouring slowly, but the top part of the mold cools while the bottom is still hot, and there are thus two contradictory requirements.

"Mechanical Properties of Some Copper—Base Alloy Castings," was a communication from the Technical Committee of the Association of Bronze and Brass Founders.

In the conclusions it was stated that it is generally believed castings in alloys with a short freezing range, typified by aluminum-bronzes and high-tensile brasses, can be made

(*Concluded on page* 143)

What's the right X-Ray film?

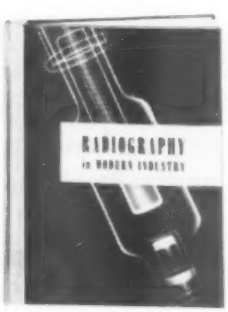
Product:
Gear housing
Material:
Magnesium
Thickness:
Walls varying $\frac{1}{4}$" to 1"
Equipment:
140-kv X-ray unit

ANSWER:

KODAK INDUSTRIAL X-RAY FILM, TYPE M

In a light alloy casting such as this, the radiographer is interested in discovering microporosity, as well as other irregularities that might be present. This requires the highest possible visibility of detail.

Therefore, Kodak Industrial X-ray Film, Type M, is chosen because this film has the highest contrast and finest graininess of all x-ray films.

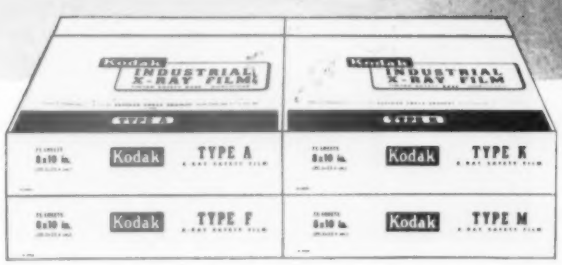


RADIOGRAPHY IN MODERN INDUSTRY

A wealth of invaluable data on radiographic principles, practices, and technics. Profusely illustrated with photographs, colorful drawings, diagrams, and charts. Get your copy from your local x-ray dealer—price $3.

Radiography . . .

another important function of photography



A TYPE OF FILM FOR EVERY PROBLEM

To provide the recording medium best suited to any combination of radiographic factors, Kodak produces four types of industrial x-ray film.

Type M provides maximum radiographic sensitivity, high contrast, and exceptional detail under direct exposure or with lead-foil screens. It has extra fine graininess, and the speed is adequate for examination of light alloys at average kilovoltage and for much million-volt radiography.

Type A offers high contrast with about three times the speed of Type M, but with slightly more graininess. Used direct or with lead-foil screens for study of light alloys at low voltages, and of heavy steel parts with 1000-kv x-rays or radium.

Type K has medium contrast with high speed. For gamma ray work and for x-ray work where highest possible speed is needed at available kilovoltage without use of calcium tungstate screens.

Type F provides the highest available speed and contrast when exposed to x-rays with calcium tungstate intensifying screens. Has wide latitude with either x-rays or gamma rays, exposed directly or with lead-foil screens.

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X-ray Division · Rochester 4, N. Y.
"Kodak" is a trade-mark

Kodak

For Melting Non-ferrous Metals In Any Furnace--

--NORTON Refractory Cements

For melting all non-ferrous metals — in high frequency and induction furnaces, pit furnaces, direct arc type rocking furnaces — Norton Company offers a complete line of high temperature cements and prefired shapes. **Fused magnesia cements** for lining Ajax-Northrup high frequency furnaces melting nickel-chromium alloys; **silicon carbide mixtures** for ramming into oil or gas fired reverberatory and pit furnaces melting aluminum, copper and zinc; **fused alumina cements** for lining burner tunnels in gas or oil fired billet heating, heat treating and annealing furnaces; **fused magnesia cement** for rammed linings in Ajax-Wyatt low frequency vertical ring induction furnaces melting high copper alloys, and cupro-nickel, nickel-silver and cadmium-bronze alloys.

NORTON REFRACTORIES®

NORTON COMPANY
WORCESTER 6, MASSACHUSETTS

(*Concluded from page* 140)

completely sound and with properties equal to those of separately cast test bars with similar cross-sectional thicknesses, provided the metal is not gassy and castings are properly fed.

On the other hand, it is well known that alloys with long freezing ranges are liable to contain dispersed porosity which reduces their mechanical properties. Tests on the valve and pump bodies referred to in the text illustrate the point. In alloys of this type, steep temperature gradients are required, in the right directions, to ensure good feeding, and the resulting improvement in mechanical properties is illustrated by the data for the chilled gear blanks and for the chill cast sticks, also described, the latter having the best properties where the temperature gradients were made most favorable by controlled slow pouring.

The main conclusion to be drawn from this preliminary work is that many more tests must be carried out to provide the background of information required by designers and manufacturers of castings in copper-base alloys.

"The Work of the Lake & Elliot Foundry Technical Committee," by L. W. Sanders, C. H. Kain, R. J. Hart, W. L. Hardy and J. W. Gardom.

The paper describes some of the work of a small technical committee set up within an iron and steel foundry. There is a discussion of the monthly examination of statistics, relating to quality in castings and economics in terms of usage of consummable materials. Details are given concerning research conducted on cast steel test bars, following on previous work with the "cloverleaf" test bar; also the attempts made to establish a reliable and workable machineability test suitable for use by foundries.

Details are given of the development ond six-months working of coated molding sands in an iron foundry, and experience with resin-bonded core sands. Tests of martensitic plough shares are described, also a discussion of sand reclamation for the steel foundry.

"The Effect of Grain Shape on the Behavior of Synthetic Core and Molding Sands," by Dr. W. J. Rees.

The influence of grain shape on the behavior of synthetic molding and core sand mixtures bonded with clays, core oils and core compounds has been investigated, using a recently developed method for the assessment of grain shape. Typical examples of the effect of grain shape on the properties of the bonded sand mixtures are given, and it is shown that for sands having comparable mechanical gradings the strength of mixtures prepared with angular sands is lower than that of mixtures based on rounded sands, and that the surface friability of the dried mold or core increases with the angularity of the sand.

"Gases in Cast Iron," by Dr. J. E. Hurst and Dr. R. V. Riley.

The investigatory work described in this paper makes it self-evident that the mechanism governing the evolution of hydrogen from cast iron upon vacuum heating is far from simple.

The hot extraction technique, which in the case of steels is recognized as giving accurate results for the estimation of total hydrogen, apparently does not work so precisely with cast iron. The composition of the gas evolved at 600 to 800° C *in vacuo* is not predominently hydrogen; it contains appreciable amounts of nitrogen and carbon monoxide. Furthermore, the treatment of cast iron in this temperature range does not secure the complete removal of all the hydrogen present in the specimen. Further amounts of hydrogen (and carbon monoxide and nitrogen) are obtained on: (a) Raising the extraction temperatures; (b) machining off the outer layers of the specimen; (c) allowing the specimen to be exposed to the atmosphere; and (d) melting the iron.

As a broad conclusion, the authors draw attention to the strong possibility that the total oxygen content, as found by vacuum-fusion analysis of gray cast iron, is not a measure of the inclusions of oxides, silicates, etc., present. The oxygen content is due in part, at least, to the presence of carbon monoxide existing either in voids in the iron or in close association with the flake graphite. Therefore, values reported for the oxygen content of cast iron may have an entirely different significance from those resulting from the gas analysis of steel.

"The Production of Metallurgical Coke," by M. D. Edington, chairman of the Coke Oven Managers' Association (Northern Section).

The paper deals with the manufacture of coke under three headings, (a) the supply of suitable coal, (b) the coking process, (c) the future of metallurgical coke. It covers the choice of coal for coke making, coal preparation methods, the addition of coke breeze, the development of ovens, with special reference to regenerative ovens. In his outlook on the future, the author states that, in Great Britain, it would appear that coal reserves of reasonable quality are theoretically adequate to maintain the supply of coke for a further century. The foundry user will be required to accept a smaller type of coke, with resulting alterations in cupola design and practice.

"Cupola Charge Materials," a report with recommendations of the subcommittee T. S. 27 of the Technical Council.

The terms of reference were: "To prepare a report and recommendations on the best methods of utilizing available materials in cupola charges." The report covers metallic materials, with special reference to the use of scrap; alloys and ferroalloys; fuels; fluxes and cupola lining materials.

"A System of Costing in a South African Steel Foundry," by C. I. Rhind, a paper contributed by the South African branch of the Institute.

The paper describes a costing method used in a works making its own steel for ingots and castings. This costing system has been developed for the special circumstances of the case, and reflects special labor conditions in South Africa.

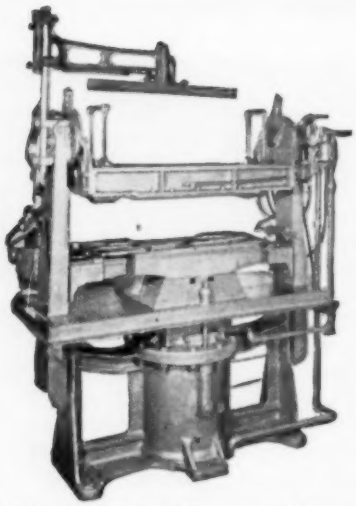
"The Organization for the Training of Apprentices in the French Foundry Industry," by D. Weles. This was the exchange paper from the Association Technique de Fonderie, Paris.

The paper describes the various methods adopted in the French foundry industry for recruiting and training apprentices. Apart from the technical and practical training, stress is given to the necessity to provide a background of general education and opportunities to guide youths in the development of artistic and intellectual pursuits, so as to enable them to use their leisure hours profitably.

"A Metallurgical Examination of a Cast Iron Cannon Ball," by Dr. J. E. Hurst and Dr. R. V. Riley.

This paper describes the examination of a cannon ball used about three hundred years ago during the Civil wars in England in the years 1643 and 1646. The authors conclude from their investigation that if the specimen examined was typical of the round shot used for missiles in the 17th century, one must regard quite highly the skill of the iron-founder of that day. The ball was well within tolerances of dimensional accuracy upon which it would be difficult to improve today. The shrinkage cavity was normal and centrally located. The quality of the metal was good and equal to modern standards.

#193 Osborn Blower, draw piston type

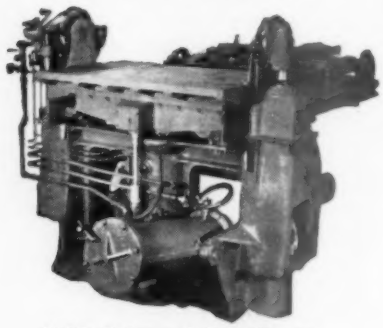


#333 Osborn Jolt-Squeeze Rollover

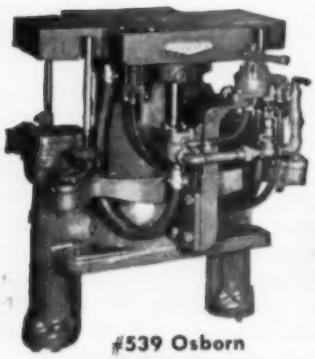
#94 Osborn Core Blower

#442 line Jolt Rockover Machine

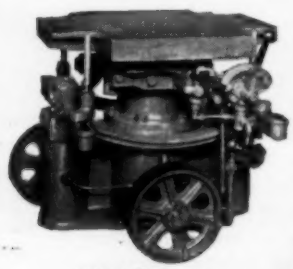
#146 Osborn Core Box Drawing Machine



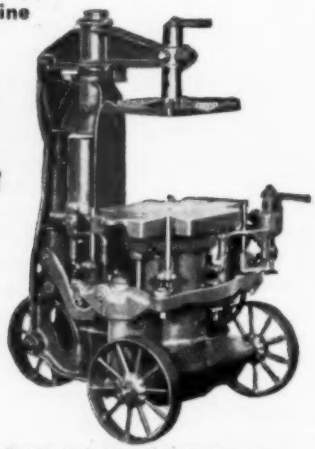
#405 Osborn Jolt Rollover



#539 Osborn Jolt Strip Machine



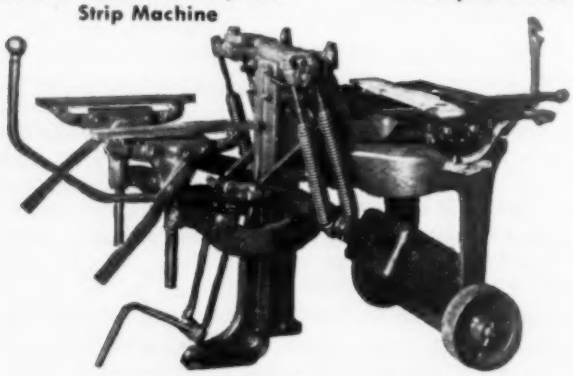
#559 Osborn Jolt Strip Machine



#710-J Osborn Jolt-Squeeze Strip Machine

#210-PJ Osborn Jolt Squeeze Machine

#413 Osborn Jolt Rollover



#42 Osborn Hand-Operated Rockover Core Machine

Many types not illustrated. Write or wire for complete information.

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5401 Hamilton Avenue Cleveland, Ohio

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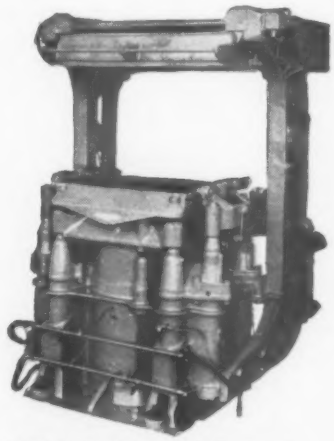
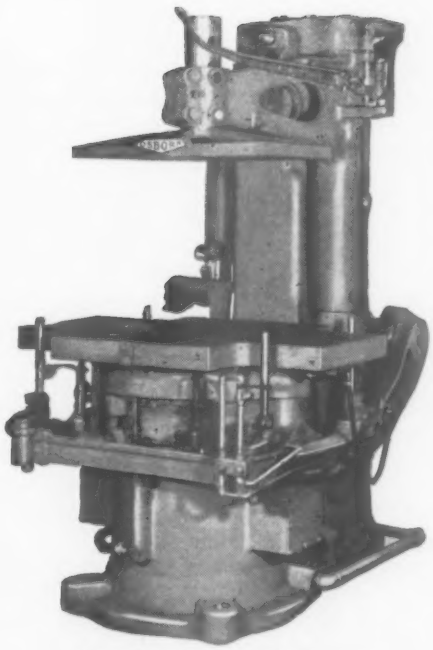
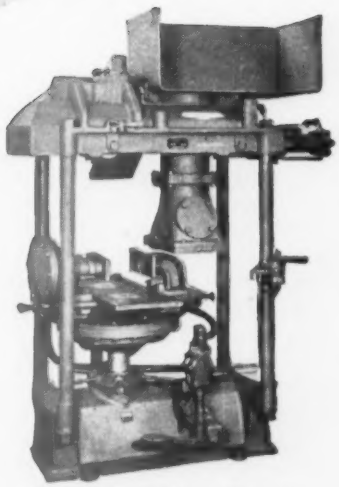
#275-J Osborn
Jolt-Squeeze Machine



#1024 Osborn Jolt-Squeeze
Strip Machine



#724-PJ Osborn Jolt Squeeze
Strip Machine



#93 Osborn Core Blower

MEMBER

MANUFACTURER'S ASSOCIATION, INC. FOUNDRY EQUIPMENT

OSBORN®

MOULDING MACHINES

CORE BLOWING MACHINES

OBITUARY

FREDERICK K. VIAL, 85, director and former vice president, Griffin Wheel Co., Chicago, died July 27, in Urbana, Ill. A native of Lyonsville, Ill., Mr. Vial was graduated from the University of Illinois in 1885. During his early career he was engaged in railway service as an engineer with various railroads, and joined Griffin Wheel Co. in 1902 as a mechanical engineer. He became chief engineer in 1906, a director in 1917, and served as vice president from 1924 until his retirement in 1948.

Mr. Vial devoted many years to improvement of the chilled car wheel, and when the Association of Manufacturers of Chilled Car Wheels was formed in 1908, he was selected as consulting engineer and later as vice president, positions which he retained until his retirement. He made exhaustive studies of the combustion of fuel within a cupola for melting iron. In 1940 he was awarded the J. H. Whiting Gold Medal of the American Foundrymen's Society for outstanding work in the development of cupola processes. He had also obtained patents on numerous improvements pertaining to design of wheels, wheel manufacturing facilities and melting processes.

* * *

Edward J. Burnell, 61, vice president, general sales manager, and a director, Link-Belt Co., Chicago, died July 22, at his home in Winnetka, Ill. Mr. Burnell was born in Wales, and settled with his family in Catasauqua, Pa. He was graduated from Lehigh University in 1910 and joined Link-Belt Co. in 1913. He had served the company in positions of salesman, district manager in Boston and Pittsburgh, general sales manager of the western division territory and as general manager of the Chicago plant. During the war he served on the advisory boards of the Machinery Branch of the War Production Board and the Chemical Corps of the War Department and as consultant to the Reconstruction Finance Corporation. He was a former director of the Foundry Equipment Manufacturers Association.

* * *

Joseph E. Kolb, 62, pattern shop superintendent, Caterpillar Tractor Co., Peoria, Ill., and a recent national director of the American Foundrymen's Society, died July 22. Mr. Kolb was born in Lewistown, Ill., and attended Bradley Polytechnic Institute. He had been associated with the patternmaking industry for over 40 years. Mr. Kolb was active in the organization of the Central Illinois Chapter of the AFS, and was the first national director elected from that chapter. He was completing his three-year term as a member of the national board.

* * *

Charles H. Morse III, vice president in charge of manufacturing, Fairbanks, Morse & Co., Chicago, and son of its president, Col. Robert H. Morse, was killed when the company's plane crashed near Roanoke, Ill., July 9. Mr. Morse joined the Beloit, Wis., plant in 1919 and later worked in the factories at Three Rivers, Mich., Indianapolis, and St. Johnsbury, Vt. In 1939 he became president of Inland Utilities Co., an affiliate of Fairbanks-Morse, and in 1946 was elected vice president in charge of manufacturing of the parent company.

* * *

William H. Bahan, 67, president and treasurer, Bahan Textile Machinery Co., Greenville, S. C., died June 29 from injuries resulting from an automobile accident. Mr. Bahan was a native of Huntington, Mass., but lived in Greenville for the last 28 years. He founded the Bahan Textile Machinery Co., in Charlotte N. C., in 1917 and served as its president since the organization. Later he operated shops and foundry in Union, S. C., and moved to Greenville in 1921. He was well known in the textile field as an inventor and manufacturer and developed numerous pieces of equipment for use in textile mills.

* * *

Alfred J. Miller, 72, chairman of the board of directors, Whitehead Bros. Co., New York, died Aug. 8 at his home in Newport, R. I. A native of Providence, R. I., Mr. Miller joined the company in 1904, succeeding his father as New England manager. Later he became vice president and treasurer, and served as president of the company from 1924 until last year when he was made chairman of the board. He was one of the founders of the National Industrial Sand Association.

* * *

James M. Davidson, 44, superintendent of the Buffalo plant, Farrel-Birmingham Co., died July 15, in Buffalo, following a brief illness. A native of Scotland, Mr. Davidson entered the Buffalo plant in 1920 as an office boy, supplementing his work with study at Technical High School. He subsequently worked in the order department, stockroom, production and purchasing departments and was appointed superintendent in 1946.

* * *

George E. France, chairman and managing director, Augusts Ltd., Halifax, England, manufacturer of foundry equipment, died July 15. Mr. France was educated at Holmfirth Technical School and Sheffield University, and joined the company 23 years ago. A well known member of the Institute of British Foundrymen, to which he had contributed a number of papers on foundry plant

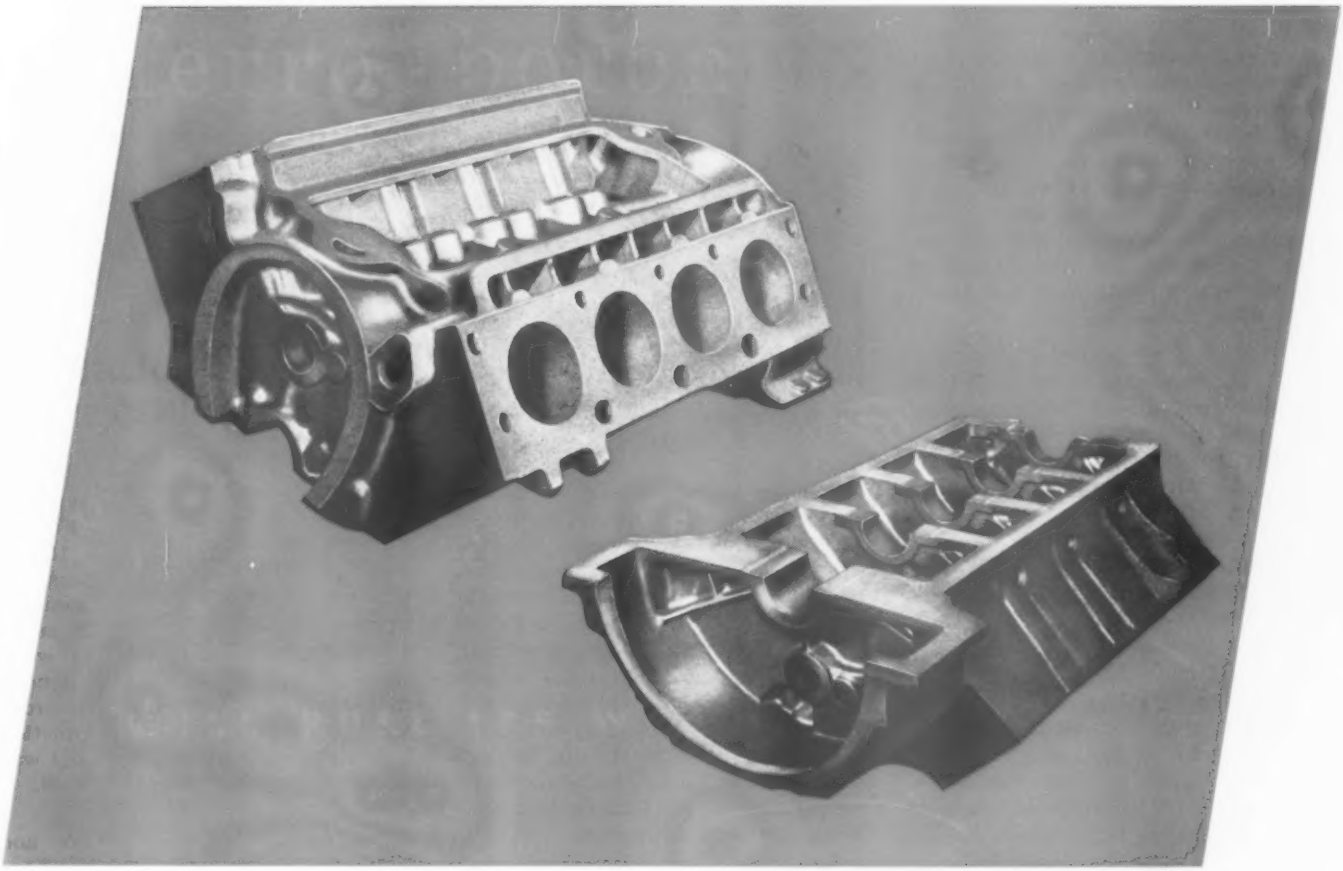
(*Concluded on page* 148)

FREDERICK K. VIAL

EDWARD J. BURNELL

JOSEPH E. KOLB

Another Engineering Achievement by BUFFALO PATTERN WORKS



These New Motor Blocks Are Made With High Accuracy Buffalo Pattern Works Equipment

Buffalo Pattern Works recently completed several duplicate sets of machined, high-speed production equipment to produce this late model cylinder block with a low scrap ratio and low machining cost. This brand of skill has been the hallmark of Buffalo Pattern Works for over 56 years.

We invite you to consult us regarding your production pattern requirements.

Since 1893

BUFFALO PATTERN WORKS

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(*Concluded from page* 146)

design and organization, he was also a past president of the Foundry Trades' Equipment and Supplies Association and of the Foundry Export Group, established by the British government during the war.

* * *

W. J. Lynch, a former vice president and director of American Steel Foundries, Chicago, died Aug. 4, in Lawrence Hospital, Bronxville, N. Y. Mr. Lynch, a native of Wellington, O., attended the former Case School of Applied Science, Cleveland, and was engaged in clerical and management work with several railroads until 1911. From that time until 1940 he was a vice president of the American Steel Foundries.

* * *

E. H. Schleede, 49, development engineer on plastic patternmaking for the Industrial Division, United States Gypsum Co., Chicago, died June 8. An authority on patternmaking, Mr. Schleede was a frequent speaker before technical groups, and recently conducted training courses for patternmaking apprentices in several metropolitan areas.

* * *

Franklin L. Whitcomb, 87, former president, Griffin Wheel Co., Chicago, died July 26, at his home in Cotuit, Mass. A native of Worcester, Mass., Mr. Whitcomb joined the company in 1889 as Detroit sales agent, becoming Chicago sales agent in 1895. He was elected vice president in 1909 and served as president from 1913 until his retirement in 1937.

* * *

J. D. Berg, 66, chief executive officer and a director of Dravo Corp., Pittsburgh, died June 29, at his home in Chatham, Cape Cod, Mass. Mr. Berg had headed the corporation since the death of its founders, F. R. and R. M. Dravo, in 1934. He served as board chairman from 1934 to 1946, when he became chief executive officer.

* * *

Alexis Caswell, retired secretary and business manager of the Manufacturers' Association of Minneapolis, died there June 3. Mr. Caswell participated in organization of the Twin City Chapter of the American Foundrymen's Society and served as its secretary from 1943 to 1947.

* * *

John N. Schweikert, 56, general manager of the Ashtabula, O., plant, Lake City Malleable Co., Cleveland, until his retirement a few months ago, died Aug. 10 at his home in Lakewood, O. Mr. Schweikert, a graduate of Case Institute of Technology, had been a consulting engineer in Cleveland for more than 30 years.

* * *

Henry O. Magnuson, 60, manager, Champion Foundry & Machine Co., Chicago, died in that city July 19 of a heart attack. Born in Aurora, Ill., June 10, 1889, and moving to Chicago at an early age, he attended public schools and Lewis Institute there. Mr. Magnuson started his business career as an apprentice at the Henry E. Pridmore Co., Chicago, in 1904, where for a period of 11 years he served in various capacities including the latter part as a designer of molding machines. Severing his connection with this company in 1915, Mr. Magnuson, with his four brothers, Alfred V., T. J., A. K. and William B., organized the Champion Foundry & Machine Co. to engage in the manufacture of molding machines and other foundry equipment. At the time of his death, he was serving as manager of this company, which has its headquarters in Chicago and plant in Rockford, Ill.

H. O. Magnuson

* * *

Edwin J. Olson, 54, president, Nonferrous Foundry Inc., Philadelphia, died July 23, at his home in Ardmore, Pa. Mr. Olson was associated with Alan Wood Steel Co., Conshohocken, Pa., for 16 years, and Treadwell Engineering Co., Easton, Pa., prior to joining Nonferrous Foundry.

* * *

Emil J. Miller, 64, vice president, secretary and comptroller, Sloan Valve Co., Chicago, died July 28 in Oak Park, Ill. He had been associated with the company 33 years, having joined it in 1916 as a bookkeeper.

* * *

Frederick H. Davis, manager, foundrate department, American British Chemical Supplies Inc., New York, died June 28, at his home in Bloomfield, N. J.

* * *

Fred W. Koenig, 40, co-owner of Art in Bronze Inc., Cleveland, died Aug. 7, at his home there. Mr. Koenig, who designed and directed the casting of bronze plaques and plates for the company, worked first as an employee in the shop, then became foreman, assistant manager and later co-owner.

* * *

John B. Gross, 95, manager of the John C. Kupferle Foundry Co., St. Louis, until his retirement 28 years ago, died July 5.

* * *

Frank J. Schlosser, 54, purchasing agent, Eagle Foundry Co., Belleville, Ill., died July 27, at his home there.

* * *

Warren A. Smith, 60, president, Smith & Richardson Mfg. Co., Geneva, Ill., maker of chaplets, died July 22.

CARE OF MOLDING MACHINES

(*Continued from page* 89)

ference. In a shockless jarring unit where the jarring piston is 6 inches in diameter, the piston anvil will be about 20 inches. Therefore, enough oil must be used to travel 63 inches around the circumference. The piston anvil is fitted with a friction ring only. The jarring piston also will require a little oil daily to lubricate the cylinder wall and piston rings.

The shockless jarring units have an internal jarring valve. Some plain jarring units are constructed with internal jarring valves and some have external valves. Others are constructed with live air lines direct to the jarring cylinder; they are valveless. It is advisable to pull out the jarring piston every five or six weeks for a thorough check. While doing this the jarring valve should be washed off with kerosene to cut the dirt. Before oiling the valve, blow it off and make sure it is free to operate. In the shockless units and some plain jarring units, the internal jarring valve is located in the jarring piston. The external jarring valves are usually found directly behind the jarring cylinder. While the jarring piston is out of the cylinder, be sure to clean the dirt off the striking faces, both on the cylinder base or piston anvil and the jar head.

There are two styles of rollover—the straight rollover, which sometimes is referred to as a rockover, and the trunnion rollover. Some rollovers use air on oil to roll the table and also to draw the pattern. Others roll on all air and transfer the mold to an elevator for drawing. The former use a thin hydraulic oil which protects the cylinder and piston

(*Concluded on page* 150)

The rapid advance of modern iron and steel-making has been due not only to improved use of standard materials but also to the introduction of new ones.

Boron has established itself definitely among the resources of iron and steel manufacture. In the economical and easily soluble form of Ferro-Boron it is approved and used by leading producers to heighten the qualities of cast iron, malleable iron, cast steel, rolled steel, tool steel and other ferrous products.

Ferro-Boron is available for all demands. In the United States, it has the advantage of abundant raw materials found within our own borders. The Molybdenum Corporation, a large producer of Boron alloys and a pioneer in developing their uses, will welcome your inquiries on any application of Molybdenum, Tungsten, or Boron.

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Sales Representatives: Edgar L. Fink, Detroit; Brumley-Donaldson Co., Los Angeles, San Francisco, Seattle.

Subsidiaries: Cleveland-Tungsten, Inc., Cleveland, O.; General Tungsten Manufacturing Co., Inc., Union City, N. J.

Works: Washington, Pa.; York, Pa.

Mines: Questa, New Mexico; Urad, Colorado.

MOLYBDENUM CORPORATION OF AMERICA
GRANT BUILDING PITTSBURGH, PA.

MCA

(*Concluded from page* 148)

against corrosion. If the rollover is all air, it must be oiled daily at the end of the day; and every eight or nine months it is advisable to check for corrosion on the rollover cylinder.

Some machines also use the rolling mechanism to draw the pattern. On this type of machine, the rollover piston is completely down in the cylinder before it starts to draw. Other machines use an elevator to receive the mold, and there is one that draws away on the flask clamps. If the piston is completely in the cylinder before drawing, wear on the piston or cylinder will not have any effect on the draw, because the weight of the rollover table and pattern equipment will keep the piston bearing on the side of the cylinder that the weight is overhanging. The rollover table can be adjusted to compensate for the wear.

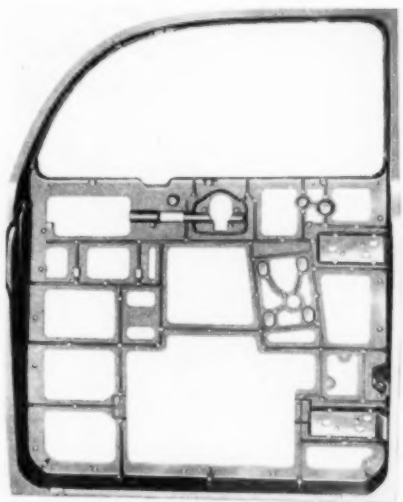
Some Require More Attention

Machines that have the elevator to draw the mold will require more attention, because, as the piston or cylinder wears, and the higher the piston is raised, the more effect the wear will have on the draw. The only way to overcome this is to have tight pins and bushings in the pattern equipment. The easiest way to adjust the rollover table for a straight draw is to fasten a square on the rollover table and place a surface gage on the mold receiving end or elevator. Draw the table or drop the elevator, whichever it may be, to see how much the draw is out. Adjust the stop bolts until the surface gage has the same clearance from the square at the end of the draw as it had at the start.

The majority of air-operated flask clamps manufactured for the rollover machines are constructed with a cup leather on the piston. Some clamps are fastened on the rollover table in a horizontal position and others are vertical. It is advisable to turn the piston a quarter turn every five or six weeks on clamps that are in a horizontal position. This will stop the cup leather from becoming flat on the bottom side, since it is always in that position. Grease is packed around the cup leather, and a little oil each day will keep it soft.

Jarring machines are easy molding machines to service. Some machines have the internal valve and others are valveless. These machines should be serviced in the same manner as the jarring units on the rollover. The machines, especially the large size, are usually located in a pit with the jarring table close to the floor. Therefore, some sand will get under the table and will build up on the surface of the jarring cylinder. Every couple of months hoist the piston partly up and clean out any sand that has accumulated under the table.

The jar-squeeze flask-lift machines or push-offs are becoming popular. The draw mechanism is different on the various make machines. Some machines have an internal or center draw cylinder and others have the external cylinder. Some machines use air on oil, while others use either live air or exhausting air. With the latter type, we must guard against condensation. If corrosion should form on the cylinder or piston walls, a jerky draw will result. With excess friction on the piston, the air pressure must build up to a certain level before this friction is broken, causing the draw to start with a jerk. If we use air on oil, the oil will protect the cylinder and piston against corrosion.



Aluminum die cast automobile door frame produced by the Doehler-Jarvis Corp. Designed in collaboration with the Kaiser-Frazer Corp., the die casting covers an area of approximately 1200 sq. in, weighs slightly more than 12 lb when trimmed

On the oil-controlled draw mechanism packing is located at the top of the draw cylinder. This packing is pulled down tight enough to prevent oil leakage, but not so tight that it will cause friction. Some foundrymen have found that keeping too much oil in the draw piston of this type machine causes the draw to be slow the full travel. A pattern with a very straight draw requires a slow draw its full depth, most patterns are well drafted and an inch or so of slow draw is plenty. Therefore, a half pint of oil should be sufficient. After all of the oil is forced through the draw piston live air goes through for the fast draw. On machines that use straight air for the draw, the slow draw is controlled by the operating valve.

Some jar pin-lift machines without a squeeze use oil for the draw. On these machines the draw piston is usually filled with oil and the slow draw is controlled at the operating valve. A thin hydraulic oil is recommended for use in the draw mechanism, but not a brake fluid. Guard against moisture in the air line, because this will build up in the piston, and since the oil is lighter than water, it will push the oil out through the exhaust.

Speaking of moisture, some time ago the author was sent to Boston on an urgent job at a foundry that had been in a new plant only two years. The plant couldn't keep an operator on a certain machine because it kept exhausting oil through the operating valve, splashing all over the operator's legs. The foreman claimed something was broken in the machine. This particular machine operated with 13 gallons of hydraulic oil. Before taking the machine apart we first checked the oil; much to the foreman's surprise, I removed 13 gallons of water! All of the equipment being new, including the air compressor, the company didn't think it was possible to get so much moisture through the air lines.

Oil Squeeze Piston Daily

On some jar-squeeze pin-lift machines, the pins are raised with the stroke of the squeeze piston, and as the squeeze pressure is exhausted the pins are held at that position. The flask comes in contact with the pins and the squeeze piston returns back in the cylinder, drawing the pattern out of the mold. On this type it is necessary to raise the squeeze piston high enough to allow for the pattern draw. Therefore, more than half of the piston's length is out of the cylinder and excess wear will develop. So be sure the guide rods and bushings are tight and keep the squeeze piston oiled daily.

The jar unit and squeeze unit on these machines will be much the same as on the standard jar squeezer. So, on all molding machines, try to make it a practice to oil the machines daily, at the end of the working day. Grease them once a week; and every four or five weeks pull the jarring piston for a thorough inspection, because that is the most vital unit. Insist that the operators keep as much sand as possible away from the working parts.

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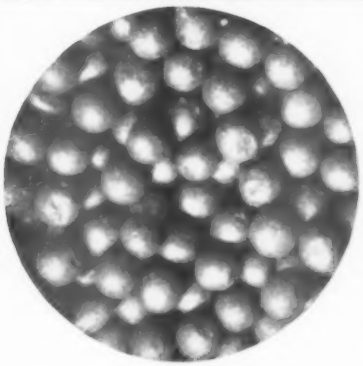
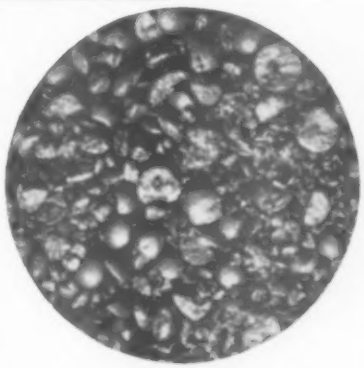
LIFE COMPARISON -- TRU-STEEL vs. CHILLED IRON SHOT

Showing relative breakdown after a given number of passes through a centrifugal blasting wheel

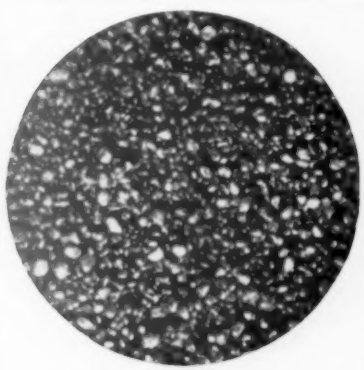
CHILLED IRON No. 230 at Mag. 10X



NEW SHOT

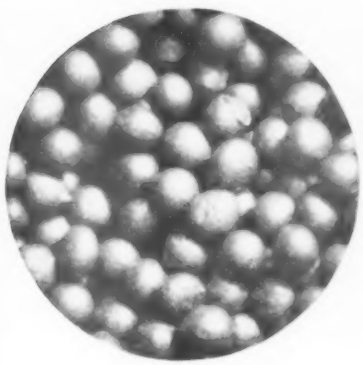


AFTER 50 PASSES



AFTER 1500 PASSES

TRU-STEEL No. 230 at Mag. 10X



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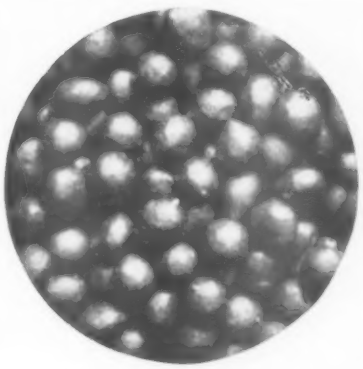

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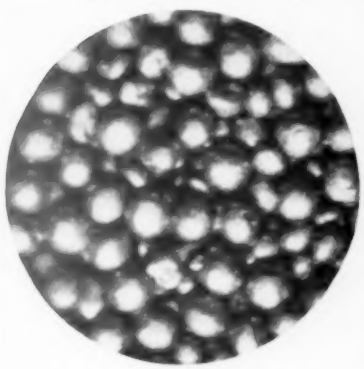

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GOOD WORKING CONDITIONS

(*Continued from page* 71)

the Memphis Works is typical of long-time company policy on this subject. In fact, International Harvester's industrial safety program, now in existence for 40 years, is recognized as one of the country's best examples of organized accident-prevention work. As would be expected, the first-aid and medical facilities at the Memphis works are of the most modern type.

A central cafeteria, comfortably air conditioned, is available to all employees. Those who do not want a complete meal or who do not want to walk to this main cafeteria can be served from food cribs located in the various individual buildings. These cribs are serviced at meal times from the main cafeteria kitchen.

Memphis in the past has not been a large foundry center, but the absence of a supply of experienced foundry workers did not pose an insurmountable problem to supervisors of the new plant. It was merely a question of hiring unskilled men and training them, but the fact that this large foundry was able to reach high-level production—accompanied by a reasonable amount of rejected castings—in a relatively short period of time attests to the efficiency with which the training program was carried out. The task was complicated somewhat by the necessity of providing two crews, since the foundry operates two eight-hour shifts five days a week.

Foundry Is Mechanized

The Memphis foundry was designed for a capacity of 120 tons of castings per shift and employs two 60-in. ID cupolas. Although extensively mechanized, the foundry would not be considered strictly a production shop; pattern changes are frequent, particularly on the smaller size castings produced, and what might be termed long runs on any parts are the exception. This results largely from the fact that output of the foundry is not confined to requirements of the Memphis Works, a portion of it going to other of the company's manufacturing plants.

General layout of the principal foundry departments is indicated by the accompanying sketch (Fig. 19). Total plant area under roof is approximately 184,000 square feet. The raw materials yard (Fig. 2) extending alongside the foundry measures 110 x 682 feet, the length of which is served by two 10-ton cranes. These cranes are equipped with both buckets and magnets for unloading pig iron, scrap, sand, etc. The crane runway extends into the structure seen in the background of Fig. 2 which houses three large sand storage bins. These bins have a total storage capacity of more than 6000 tons.

Core sand mixing is conducted on a mezzanine floor adjacent to the storage bins. A rotary dryer, capable of drying 8 tons of sand per hour, feeds the sand into three 50-ton capacity hoppers from which it is released as needed into a weigh hopper for discharge into the 1500-pound capacity mixer shown in Fig. 3. From this mixer the prepared sand is carried in buckets over a monorail to hoppers located at the blowers and benches of coremakers on the floor below. A portion of the coreroom is shown in Fig. 4. Equipment here includes three large blowers and six benches, two of the latter being provided small bench blowers. As seen in Fig. 4, coremaking stations are located alongside a monorail chain conveyor which moves the green cores on 110 carriers of 5 trays each into the horizontal, continuous baking oven shown in Fig. 5. Cores are baked three hours at 475°F. A wide variety of cores are made, ranging up to a maximum weight of about 120 pounds. Core requirements average about 25 pounds per 100 pounds of castings.

Molding sand preparation and distribution facilities are located in an overhead tower, situated approximately in the middle of the molding floor. This tower contains two duplicate sets of equipment, one supplying the molding lines on which the smallest castings are produced and the other serving the intermediate and largest casting lines. Return sand from the shakeouts is elevated to the top of the sand tower where it passes through a screen and rotary cooler to two 125-ton capacity storage bins. From these bins the sand is fed to two 3000-pound capacity mixers on a lower level and then discharged after aeration to belt conveyors leading to the individual molding station hoppers.

As indicated by the plant layout sketch, three different types of molding units are provided for heavy, intermediate and light work. The largest jobs—usually castings weighing 80 to 300 pounds—are handled on what is known as the slinger unit. This consists of two stationary sand-slingers, each serving four cope or drag stands located on a turntable. One of the slingers may be seen in Fig. 6, which illustrates how the flasks are removed from the stands by a jib crane hoist, deposited on the nearby power mold conveyor, the cores placed and the molds closed. Molds from the slinger unit are poured at the right in Fig. 6; a close-up view of the operation is shown in Fig. 7. This pouring station, equipped with exhaust hood, is served by 1000-pound capacity ladles suspended from electric hoists which travel over a monorail.

After passing through a cooling hood the molds are opened, the copes are shaken out and the cope flasks are returned over a roller conveyor to the mold station. Castings are removed from the drags and, with the aid of a hoist, are attached to an overhead traveling chain conveyor, as shown in Fig. 8. Terminus of this conveyor is the casting cleaning department. At the drag shakeout a pneumatic pusher (Fig. 9) shoves the drags from the mold conveyor onto the shakeout grid, and the empty flasks emerge from the opposite side to a roller conveyor leading to the slinger stands, as shown at the left in Fig. 6. The slinger unit employs 18 men, including pouring and shakeout operators.

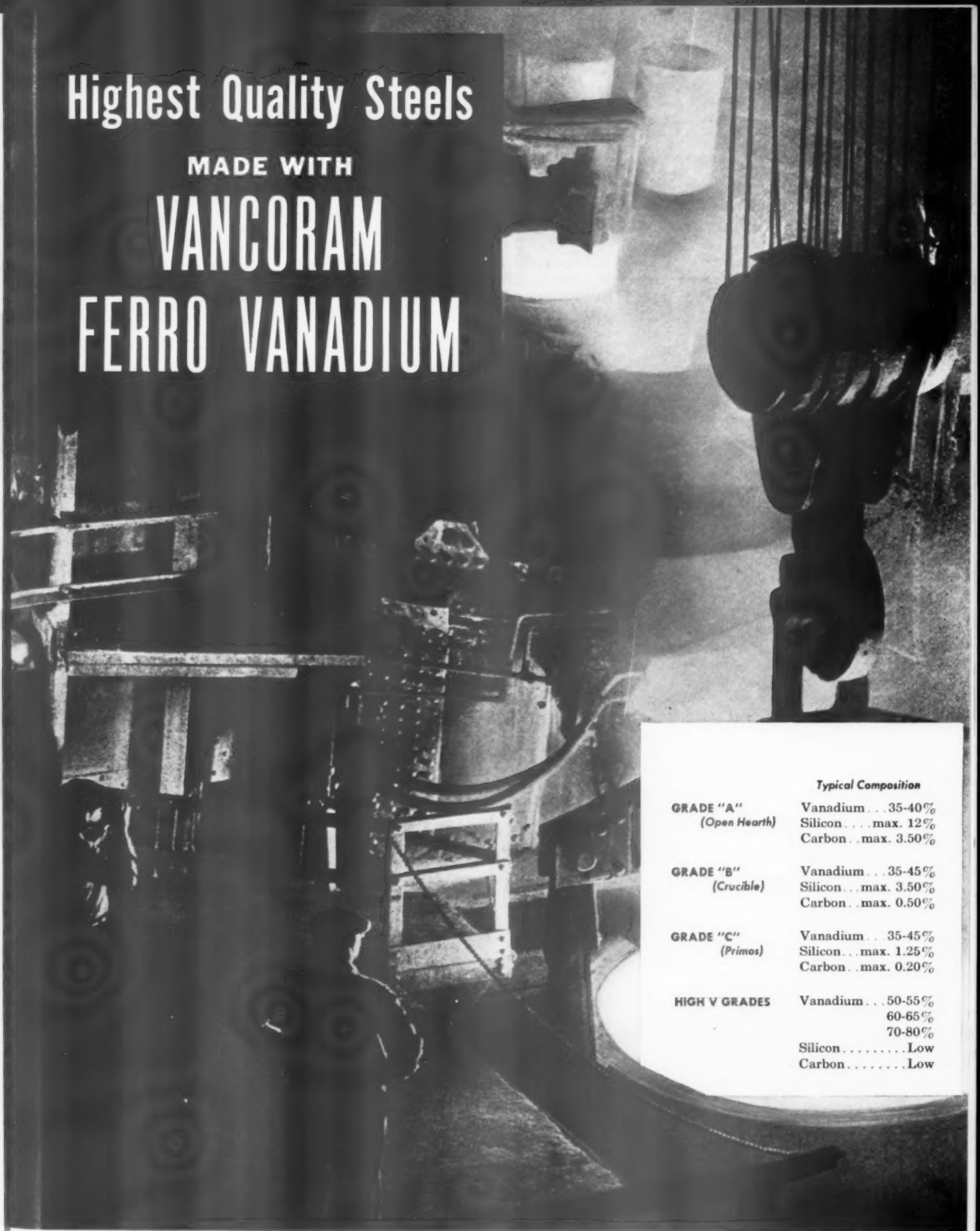
Handle Tight and Snap Flask Work

The intermediate molding unit, which parallels the slinger unit, comprises three cope and three drag molding machines, some of which appear in Fig. 10. Both tight and snap flask work are handled on this unit, and molds are carried to pouring and shakeout stations by a power conveyor loop. Power hoists operating over short monorails transfer molds from machines to the conveyor.

Facilities for producing the smallest castings have a somewhat unusual layout which provides considerable flexibility in operations. Instead of using one mold conveyor line, as in the case of the slinger and intermediate units, six individual lines are available. Each line, comprising what are termed snap flask units, has four jolt-squeeze pin strip molding machines and three plain jolt-squeeze machines. Molding stations of two adjoining lines are shown in Fig. 12. The grating seen in the center permits spill sand to be returned to the central system via an underfloor belt conveyor.

Each line is manned by seven machine operators, a weight and jacket handler and a pourer. Frequent pattern changes on the snap flask units make it desirable to operate only six of the seven molding machines of each line simultaneously while the

(*Concluded on page* 155)



	Typical Composition
GRADE "A" *(Open Hearth)*	Vanadium . . . 35-40% Silicon . . . . max. 12% Carbon . . max. 3.50%
GRADE "B" *(Crucible)*	Vanadium . . . 35-45% Silicon . . . max. 3.50% Carbon . . max. 0.50%
GRADE "C" *(Primos)*	Vanadium . . . 35-45% Silicon . . . max. 1.25% Carbon . . max. 0.20%
HIGH V GRADES	Vanadium . . . 50-55% 60-65% 70-80% Silicon . . . . . Low Carbon . . . . . Low

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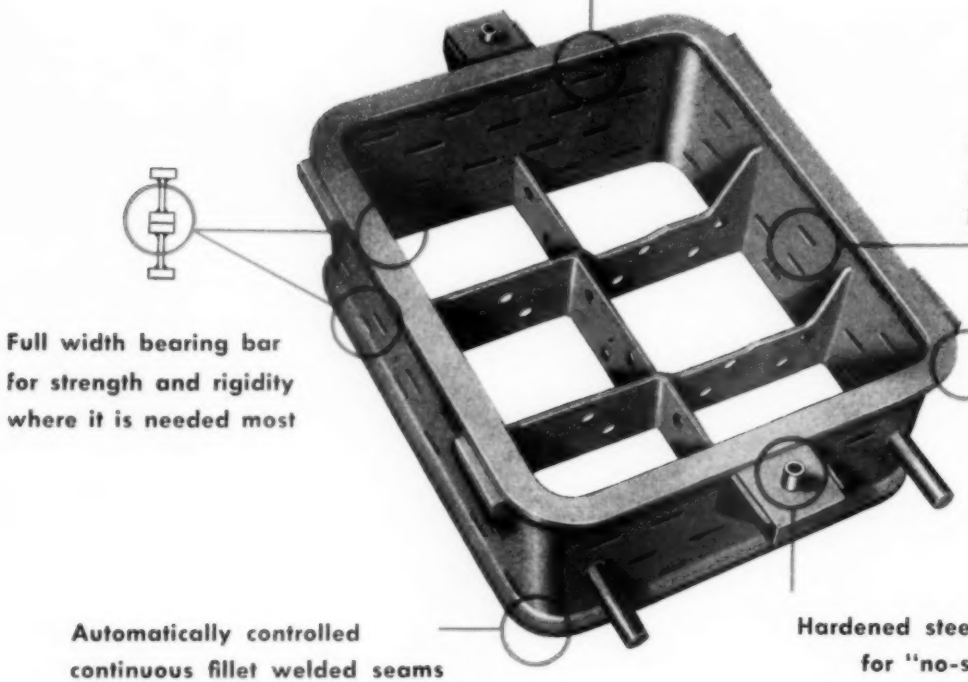
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(*Concluded from page* 152)

seventh is being rigged. Molds are jacketed and weighted after leaving the molding stations and are poured near the end of the conveyor loop. Pouring ladles of 350 pounds capacity are suspended from a monorail which extends from the pouring platform to an adjoining aisle where metal is received from a large transfer ladle, as shown in Fig. 11. Poured molds enter an exhaust tunnel as the conveyor makes the return loop, this hooded section extending for most of the molds' travel to a shakeout at the opposite loop.

Lift Trucks Transport Hot Metal

All hot metal required by the three different molding units is transferred by lift trucks in the manner indicated in Fig. 11. The 6000-pound capacity insulated ladle is mounted on a skid attached to the truck platform. From his normal position the truck operator controls tilting of the ladle by means of a handwheel (Fig. 13), raises the ladle through the truck's usual lifting mechanism, and also operates the lid which covers the ladle inlet opening. Cupola iron is tapped continuously into a 6-ton capacity holding ladle, as shown in Fig. 13, before being poured into the transfer ladles. Staggering the time at which the various molding lines shut down for lunch prevents an excessive amount of molten metal from being accumulated.

The two 60-inch cupolas are operated on alternate days. They are the rear slagging type, and use of a hot blast system assists in attainment of a 11 or 12 to 1 iron-coke ratio. Slag is dischaged into a water bath (Fig. 14) from which it is removed by a bucket elevator.

Extensive reliance on mechanical aids in the making and pouring of molds is duplicated in the melting department. The large yard cranes deposit pig iron and scrap in prescribed booths on the platform shown in Fig. 16. There the magnet of a smaller 5-ton crane picks up the metal as required and places it on a conically shaped chute in the center of the platform, through which it is released to a charging bucket on the floor below. Fig. 15 shows how the cone-bottom buckets are carried on four cars traveling around a circular track and can be spotted directly below the opening in the metal platform as well as under one in an adjoining bin through which coke and limestone are discharged. This arrangement permits a charge to be made up in one bucket while another is being raised to the charging door, emptied and returned to a conveyor car for picking up another charge.

Cupola metal is tapped at more than 2700°F and poured at approximately 2600°. Iron analysis adhered to is 3.35±1.10 per cent carbon, 2.00±1.10 per cent silicon, 0.12 per cent max sulphur, 0.50 per cent max phosphorus, and 0.65±.15 per cent manganese. All the iron is inoculated.

The cupola room, measuring 198 x 44 feet, was designed to accommodate a second pair of cupolas should plant expansion become desirable. In fact, the entire foundry was laid out with this possibility in mind. Ground available on the south side of the building is sufficient to house molding and sand preparation facilities duplicating the existing layout.

The casting cleaning department maintains the high standard of good housekeeping evidenced elsewhere in the plant, an important contributing factor being the extensive use of exhaust equipment wherever dust might be created. Cleaning facilities are varied, including airless blast units of both the barrel and chamber type, tumblers, and chipping and hand grinding booths. Castings from the slinger and intermediate units are received at the cleaning department via the casting cooling chain conveyor, while an apron conveyor transfers castings from the snap flask lines. Fig. 17 shows small castings being sorted into tote boxes for subsequent dumping by lift truck into tumblers. They are unloaded from the barrels by hand.

Certain of the large castings are attached to a monorail chain conveyor (Fig. 18) which carries them through an airless blast cabinet and returns them for unloading onto roller conveyor lines leading past chipping booths. Booths where hand grinding is conducted with portable tools are well hooded, as indicated in Fig. 1.

A well equipped pattern shop is expected eventually to employ 40 men on two shifts in the production and repair of wood and metal patterns. Ample storage space is available in a nearby pattern vault, measuring 130 x 67 feet, to accommodate a growing number of patterns.

Close control is exercised throughout the various foundry operations. Sand tests are made hourly, and regular checks are made on metal analysis and properties, including wedge tests. Major part of the laboratory work concerned with the foundry is conducted in a separate laboratory building, a well equipped unit which serves the entire works.

An interesting and valuable control device concerned with the proper functioning of mechanical equipment throughout the foundry is a centrally located panel board, which by means of signal lights tells at a glance whether or not each of the various electrically operated units of the materials handling system is operating. Warning is flashed of any breakdown and its location can be spotted immediately.

EYE-STOPPER: Persons passing the plant of the Chambers, Bering, Quinlan Co., Decatur, Ill., have little trouble ascertaining the name of the company and the fact that it produces gray iron castings. This sign, recently erected along the plant's railroad siding, measures 15 x 35 feet, is painted in striking colors and is illuminated at night

ACTIVITIES OF FOUNDRY *Groups*

Birmingham

A DINNER meeting of officers and directors to make plans for the 1949-50 season of the Birmingham District Chapter of the AFS was held at the Tutwiler Hotel, Birmingham, July 19. Those present were guests of C. P. Caldwell, Caldwell Foundry & Machine Co., Birmingham, who is chairman of the chapter.

Unanimous approval was given plans for the annual picnic outing to be held at Roebuck Country Club on Sept. 3 at which 500 foundrymen and friends are expected. The directors approved holding a meeting in Anniston and in Tuscaloosa, Ala., as an accommodation to the large number of members from those cities who attend meetings regularly in Birmingham. After much discussion, it was decided to have a social period before each meeting. The social hour, dinner and technical session will provide opportunity for fellowship as well as technical discussion of individual problems of mutual interest.

Dates for the chapter's regional conference were set as Feb. 9 and 10, 1950.

The following were appointed committee chairmen by Chairman Caldwell: Morris Hawkins, program; E. A. Brandler, entertainment; W. W. Hazzard, registration; R. F. Frings, visitation, and J. P. McClendon, publicity.

Mr. Caldwell and Fred K. Brown, the chapter's secretary-treasurer, reported on the Chapter Chairmen's Conference which they attended in Chicago.—*J. P. McClendon, Stockham Valves & Fittings.*

Northwestern Pennsylvania

AN ORGANIZATION meeting of the Northwestern Pennsylvania Chapter of the AFS was held in the Williams room of the Erie YMCA, Aug. 1. Chapter Chairman Joseph A. Shuffstall, National Erie Co., presided. Plans were discussed for various activities of the chapter during the coming year.

Committees have been appointed to handle various phases of the year's program, with the following serving as chairmen: Top Management, W. J. Johnson, National Erie Corp.; Publicity, Earl M. Strick, Erie Malleable Iron Co.; Technical Education, Roger W. Griswold, Erie Malleable Iron Co.; Technical Development, Robert A. Erskine, National Erie Corp.; Finance, Fred J. Carlson, Weil-McLain Co.; Attendance, Earl M. Strick, Erie Malleable Iron Co.; Membership, Bailey D. Herrington, Hickman, Williams & Co.; Entertainment, Charles F. Gottschal and Courtney Wilcox of Cascade Foundry Co., and Duane Davis, Urick Foundry Co.; Reception, Clyde E. Cooper, Keystone Brass Works; Program, Frank P. Volgstadt, Griswold Mfg. Co.

J. Marcus Morrison, U. S. Radiator Corp., Dunkirk, N. Y., heads the program committee for the Dunkirk meeting; C. S. Hahn, National Transit Pump & Machine Co., is program chairman for the Venango county meeting, and J. Douglas James, Cooper-Bessemer Corp., Grove City, Pa., chairman for the Mercer county meeting.—*Earl M. Strick, Erie Malleable Iron Co.*

Tennessee

UPON completion of the 15-week foundry practice course, the Tennessee Chapter of the AFS held a dinner at the Chattanooga Golf and Country Club on June 17 at which certificates were presented to the graduates. The course, organized as a means of increasing the knowledge and skill of the members in general foundry practice, was jointly sponsored by the Extension Division of the University of Tennessee and the chapter.

George Hesse, U. S. Pipe & Foundry Co., was co-ordinator and presided at the meeting. Speaker of the evening was P. L. Arnold, resident man-

(*Continued on page* 158)

TENNESSEE: June 17 dinner meeting of the Tennessee Chapter, AFS, marked the conclusion of a course in general foundry practice sponsored by the chapter and University of Tennessee's Extension Division. Speakers at the dinner and some of the course participants are shown here

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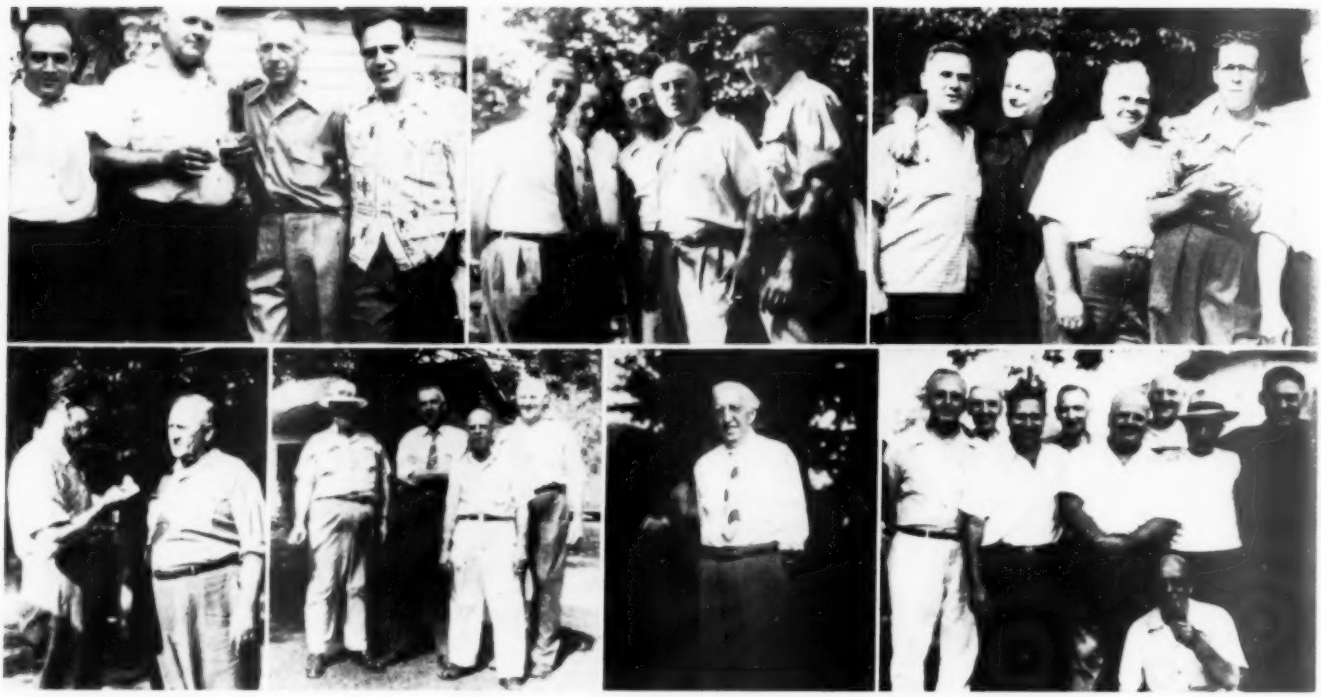

WESTERN NEW YORK: Members of Western New York Chapter, AFS, gathered at Sturm's Grove near Buffalo, June 25, for their annual stag outing. A few of those present are shown in the accompanying views supplied through courtesy of Jack Heysel, E. J. Woodison Co., Buffalo

(*Continued from page* 156)

ager of U. S. Pipe & Foundry Co., and the chapter's vice chairman. He discussed "The Foundry Practice Course as Seen from Management and AFS Viewpoints."

F. C. Lowry, director of the Extension Division of the university, also spoke, describing the facilities available at the university and its desire to help the people of the state through extension courses. Others who spoke briefly were: Gordon Street, president, Wheland Co.; Keith Harris, vice president, Ross-Meehan Foundries, Inc.; O. E. Walker, vice president and general manager, Columbian Iron Works; Harry Griscom, manager, Foundry Division, Wheland Co.; S. C. Northington, foundry superintendent, Combustion Engineering Co.

Certificates were presented to George Hesse, Wallace Herb, W. H. Lawrence, Knox Riley, C. A. Riggs Jr., W. L. Austin, B. E. Howard of U. S. Pipe & Foundry Co.; Karl Landgrebe, Sam Leventhal, Tom Alford, Henry Lukrafka, Tom Deakins of Wheland Co.; Harry Nelson, Carl Barker, J. D. Cliett Jr. of Crane Co.; Charles Chisholm, Robert Young.

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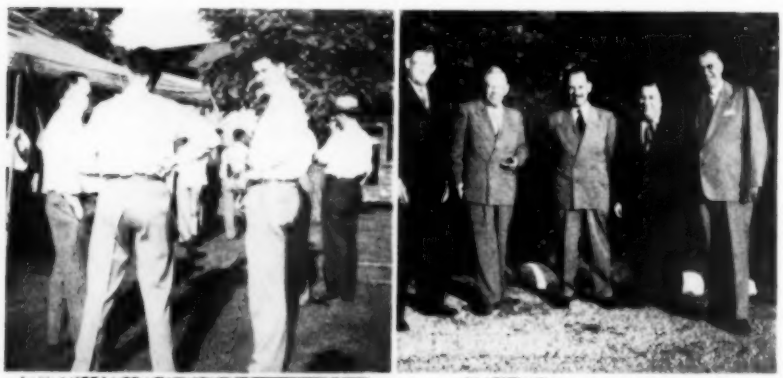
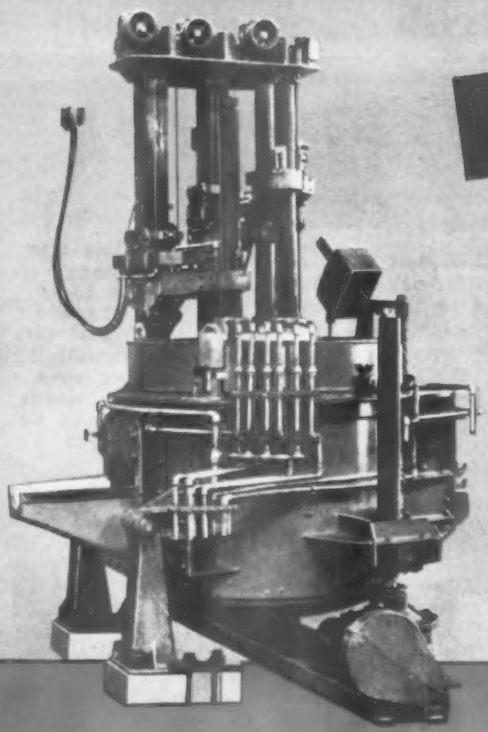


WISCONSIN: Showing some of the participants in the 14th annual foundry outing of the Wisconsin Chapter, AFS. Held July 15 at the Ozaukee Country Club near Milwaukee, the event included golf, dinner and entertainment. The committee in charge was headed by John Olle, Motor Castings Co., chairman, and Marvin A. Knoller, Electro Refractories & Alloy Corp., and Seward Shaver, Werner G. Smith Co., co-chairmen. (Photos by Clyde R. Ethier, Pendergast Sand Co., Milwaukee)



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The special Shanafelt flange formation adds stiffness and reinforcement, and provides an efficient sandstrip at the parting edges.

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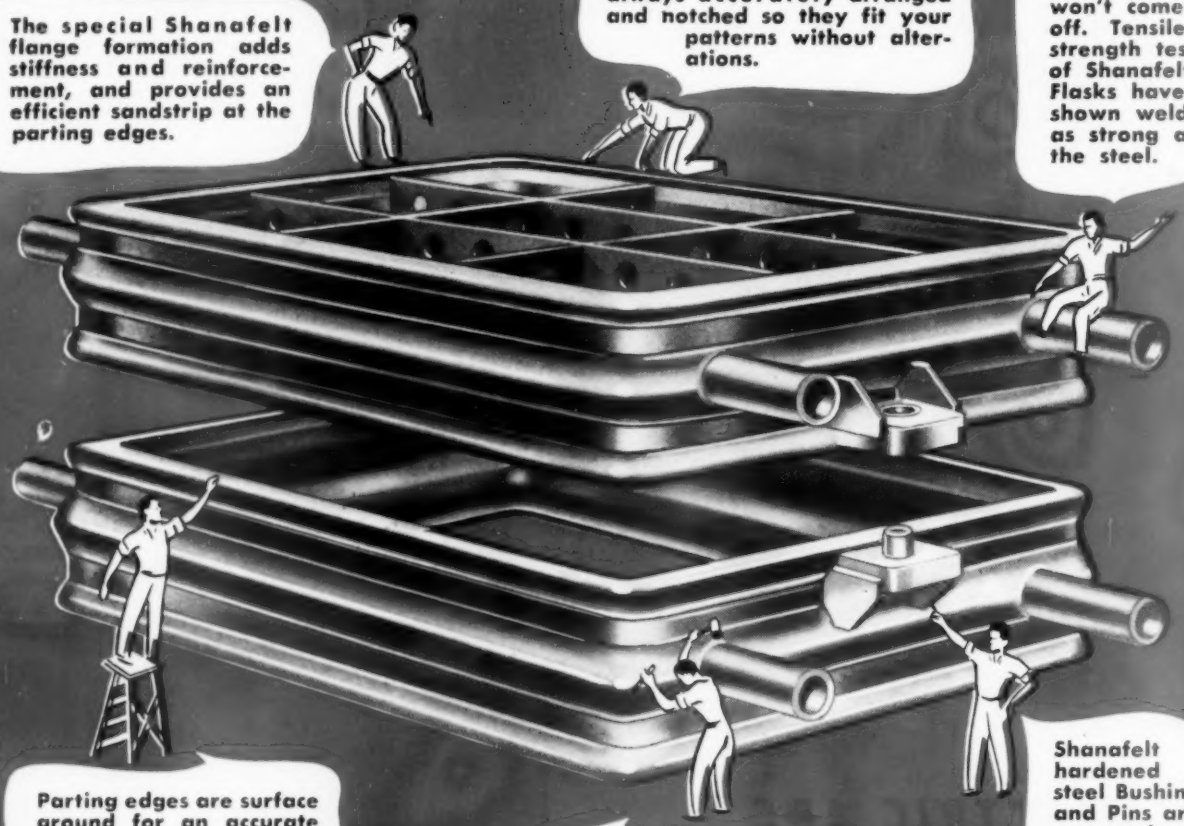

Parting edges are surface ground for an accurate match.

This steel is made to Shanafelt's special formula. It is copper bearing and rust resisting.

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John Lasater, John Kosik, Arden Imm, John Gryder of Combustion Engineering Co.; Don Andrews, C. E. Jones of Columbian Iron Works; and William Greiser and Clayton Genug of Ross-Meehan Foundries Inc.

W. L. Austin, U. S. Pipe & Foundry Co., John Lasater, Combustion Engineering Co. and Sam Leventhal, Wheland Co., were the committee in charge of arrangements for the dinner.—*Carl A. Fischer Jr., Fischer Supply Co.*

Twin City

AN attendance of 190 members and guests enjoyed the annual golf party of the Twin City Chapter of the AFS held at the Midland Hills Country Club on July 25.

A guest, Elmer Foss, was winner of the golf tournament with low score of 75; Paul Kordiak, Scott-Atwater Foundry Co., Minneapolis, had low score for member golfers. During dinner, Kathy with her accordian entertained. Prizes were awarded eight participants in the golf tournament and many additional prizes were raffled off. David Gramling, Northwestern Marble Co., Minneapolis, won both a golf and a raffle prize. The committee in charge of arrangements for the outing was headed by Francis Marrin, Marrin Foundry Inc., Minneapolis. — *J. D. Johnson, Werner G. Smith Co.*

Chicago Foundrymen

AS A DEVIATION from its custom of confining meetings to business sessions, the Chicago Foundrymen's Association went social on June 16 and arranged a ladies' dinner. This party, first of its kind, was held at the Swedish Engineers' Society, which occupies a large baronial mansion on Wrightwood avenue near Lake Michigan. After the cocktail hour, members and their ladies enjoyed a typical Swedish dinner with all that the name implies—then a vaudeville show and finally a dance. Adjudged a success by about 100 members and guests, the event is likely to get annual billing.

The association's Program and Events Committee consists of H.R. Erickson, assistant treasurer, Noonan-Malmstrom Co., Chicago; H. C. Swanson, vice president, Arrow Pattern & Foundry Co., Chicago; and H. R. Plumer, secretary, D. R. Sperry & Co., Batavia, Ill.

Officers of the Chicago Foundrymen's Association are: President, T. L. Arzt, president, T. L. Arzt Foundry Co.; vice president, R. D. Phelps Jr., secretary, Francis & Nygren Foundry Co.; secretary-treasurer, C. V. Adams, works manager, Vulcan Iron Works; and executive vice president, G. C. DeHeus, 343 S. Dearborn St., all of Chicago.

Central Indiana

A MEETING of Central Indiana Chapter directors, presided over by S. F. Swain, new chapter chairman, was held Aug. 1, in the Athenaeum, Indianapolis. Ten directors and officers attended the dinner meeting.

Primary objectives of the meeting were discussions of new methods to maintain membership levels and attract new company and sustaining members to the chapter, and discussion of final plans for the annual chapter picnic and outing to be held Sept. 10, at the Lakeshore Country Club, Indianapolis.

A plan for bringing in new company and sustaining memberships is to be worked out in detail by the membership committee, headed by Allen J. Reid, Indianapolis. The plan is to be presented at the next directors' meeting, for approval and further action.

Plans for the picnic and outing, as presented by the picnic committee, were reviewed and approved.

Carl Schopp, foundry superintendent for the Link-Belt Co., Indianapolis, was appointed chairman of the new education committee, which is expected to submit plans for educational activities for the coming year, at the next directors' meeting.—*W. K. Mitchell.*

Wisconsin

THE 14th annual outing—stag and dinner—was held by the Wisconsin Chapter of AFS, July 15, at Ozaukee Country Club near Milwaukee. Perfect weather for golfing brought many foundrymen out to the links, and many supply men and guests participated. The golf committee consisted of John Olle as chairman, with Marvin A. Knoller and Seward Shaver as co-chairmen.

EASTERN NEW YORK: G. E. Moore (top), foundry superintendent, Adirondack Foundries & Steel Inc., Watervliet, N. Y., speaking before the Eastern New York Chapter, AFS, on "Foundry Procedure for Steel Castings Made for Use on D-Day." Lower view shows a display arranged by the company of its products and processes

LADIES' NIGHT: A social evening supplanted the usual business meeting of the Chicago Foundrymen's Association on June 16. Bottom panel shows, left to right: T. L. Arzt, association president; G. C. DeHeus (background), executive vice president; Mrs. Joe Arzt; Joe Arzt; C. T. Milles, director; Mrs. T. C. Kammholz; T. C. Kammholz, counsel; Mrs. H. M. Thullen; H. M. Thullen, assistant counsel, and Mrs. T. L. Arzt

Other members of the golf committee were C. L. Tanner, Clarence Gehrman, Art Janes Jr., Frank Jacobs, C. N. Spidell, George Tisdale and Ted Meagher. No record-breaking golf scores were reported, but a low note was sounded by one newcomer in the game, who reported 160 for 18 holes, and said it was the first time he ever had a golf stick in his hands.

Door prizes, offered by more than 175 foundry supply houses and others, were awarded, with many prizes for the golfers. A good floor show concluded the program. About 550 members and guests attended the outing.

President Robert Woodward of Wisconsin Chapter announced the following publicity committee members for the coming year: Frank W. Jacobs, chairman; Don M. Gerlinger, co-chairman; Leonard Gratz, Leslie Woehlke, Norman Amrheim, E. G. Tetzlaff, J. L. Kammermeyer, John E. Hubel and Walter V. Knapp.—*John E. Hubel.*

Committee Studies Teaching Methods

American Society for Metals, Cleveland, has established a new committee to examine and make available constructive analysis on methods and results of teaching process metallurgy in technical schools and colleges. The new committee, known as the Subcommittee on Process Metallurgy, is under the chairmanship of R. Schuhmann Jr., professor of metallurgy, Massachusetts Institute of Technology. It will function as a part of the ASM Advisory Committee for Metallurgical Education, of which Prof. A. R. Troiano, University of Notre Dame, is chairman.

Assisting Prof. Schuhmann on the subcommittee are the following: Prof. J. Gregg, department of metallurgy, Cornell University; Prof. T. L. Joseph, assistant dean, Institute of technology, University of Minnesota; Prof. H. H. Kellogg, School of Mines, Columbia University; Prof. E. A. Peretti, department of metallurgy, University of Notre Dame; Prof. W. O. Philbrook, department of metallurgical engineering, Carnegie Institute of Technology; Prof. L. M. Pidgeon, department of metallurgical engineering, University of Toronto; Prof. A. W. Schlecten, department of metallurgical engineering, Missouri School of Mines and Metallurgy; and Prof. J. P. Spielman, department of metallurgy, Montana School of Mines.

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- Produce Smoother Castings
- Reduce Foundry Smoke

Whether you cast in sand, permanent molds or dies, **"dag"** colloidal graphite can help you.

Chill coating materials made with **"dag"** colloidal graphite dispersions form dry films of graphite that resist oxidation, minimize gas pockets and permit easy removal of the chill.

When sprayed or brushed on patterns, dies and permanent molds, **"dag"** dispersions form a micro-thin film that insures rapid, clean parting and smooth casting surfaces. The coating is so thin that castings are kept to close tolerances.

Whatever the casting temperature, you will reduce or eliminate choking fumes and smoke by using aqueous **"dag"** dispersions . . . a break for the men in the shop. **"dag"** colloidal graphite also eliminates binding and stripping when applied to screw threads, flask pins, etc.

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J-14

Better Lighting MEANS Better Castings

Fig. 1 — Each molding station is equipped with two 100-watt lamps

ADEQUATE illumination, when combined with efficient foundry practice, can have a highly beneficial effect on both quality and quantity of castings produced. This has been demonstrated recently by the Anderson Brass Works Inc., Birmingham, which company specializes in production of aluminum and copper-base alloy castings for use on electrical transmission and distribution line systems and power substations throughout the world.

The Anderson plant is so constructed that it receives little benefit from natural light, and heretofore depended on simple drop cords with 200-watt incandescent lamps. In re-equipping the plant with fluorescent fixtures, the illumination was increased from the former level of 20 foot-candles to a range of 50 to 150 foot-candles in general and specialized working areas.

At each of the six molding stations in the bronze foundry, shown in Fig. 1, 80 footcandles are maintained by two 100-watt lamps mounted over the work areas. The metal pattern shop, Fig. 2, also employs fixtures equipped with two 100-watt lamps to give direct light of 150 foot-candles to working areas. In the cleaning room, Fig. 3, a continuous row of two-lamp, 100-watt fixtures mounted at a 7-foot height over working areas provides more than 100 foot-candles. The fixtures are washed and polished weekly and blown off with air daily to maintain maximum lighting efficiency.

Improved lighting has directly contributed to an increase in production efficiency of more than 18 per cent with a 25 per cent betterment in casting quality, according to R. J. Tierney, plant manager.

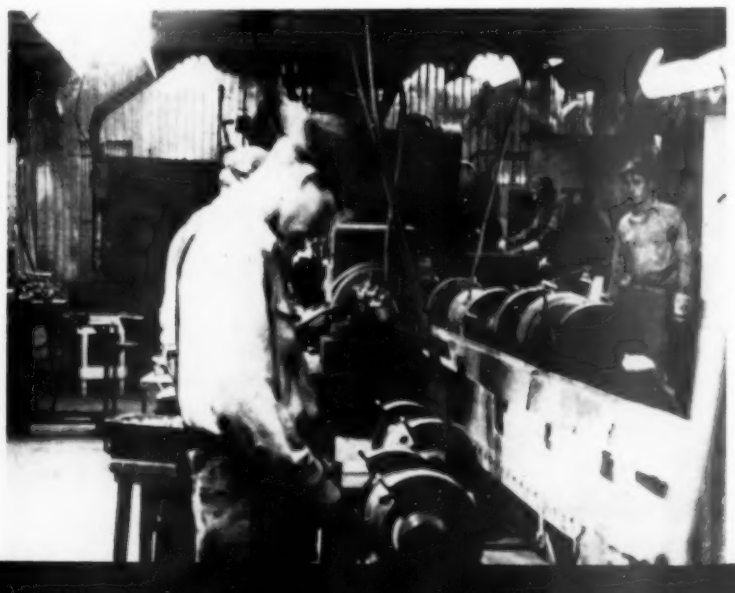
A substantial increase in productive capacity also has resulted from improved molding methods established in co-operation with the Tabor Mfg. Co., Philadelphia. All molding in the brass foundry now is handled by two 13-inch, yoke-type, jolt-squeeze, flask-lift machines and four 10-inch jolt squeezers. Two auxiliary molding benches are available for miscellaneous work. Faced with a large number of orders for short runs, the company formerly handled these with loose pattern equipment, ramming the molds by hand on the bench. These jobs have been moved to the jolt squeezers by using sectional plates with a fixed frame for each size flask. Quarter and half section plates were developed which dove-tail and lock into the matchplate frame. This has resulted in average squeezer production of about 125 molds a day, compared with 35 to 40 molds formerly.

Standard production items are made on the jolt-squeeze flask-lift machines. This represents a gradual development from the original loose

(*Continued on page* 166)

Fig. 2—Metal pattern shop is provided with units giving 150 foot candles to working areas

Fig. 3—Cleaning room has a continuous row of fixtures providing more than 100 foot-candles



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Two sure ways to increase the profits of your foundry are stepped-up production and lowered costs. Their light weight make Black, Sivalls & Bryson Foundry Flasks easier to handle. They are a ready aid in saving sand and preventing re-runs. The unusual strength of their welded steel construction insures long, accurate service under most rugged shop conditions.

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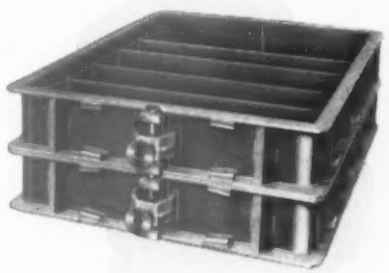
Foundry men with a background of long years of experience make BS&B Foundry Flasks. They know that flasks are precision tools . . . and must be made by precision methods. BS&B originated the welded steel flask . . . pioneered the steel-bushed flask. The huge BS&B factory with its skilled craftsmen and the most modern equipment is ready to carry out your specifications.



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Any shape, any size flask for any purpose, with any combination of fittings . . . built to your order by men who know the foundry! See your nearest BS&B Distributor, or send coupon today to Special Products Division, Section FF10, Black, Sivalls & Bryson, Inc., Power and Light Bldg., Kansas City 6, Mo.

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IMPORTANT IMPROVEMENT in POURING EQUIPMENT

INDUSTRIAL'S NEW *Distributor*

Distributes Molten Metal

QUICKLY, SAFELY, EASILY

- Worm and worm gear drive.
- Anti-friction bearings.
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- No brake required.
- Fully enclosed.
- Oil bath lubrication.
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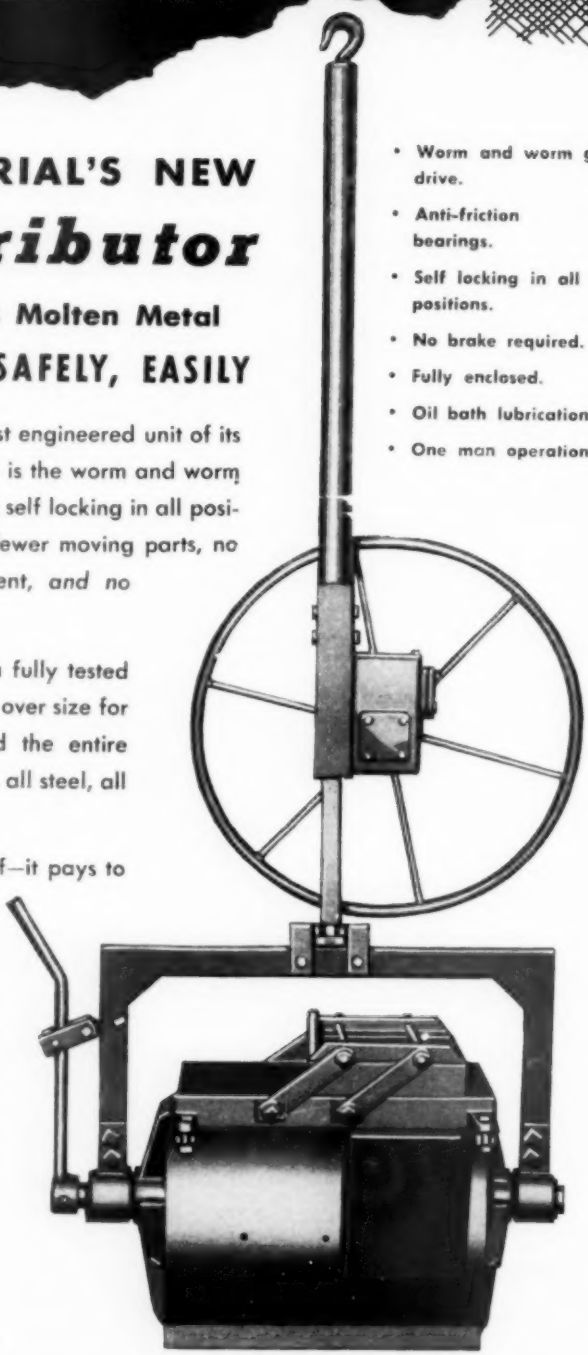
Here it is—the finest engineered unit of its type. Key feature is the worm and worm gear drive which is self locking in all positions. There are fewer moving parts, no need for adjustment, *and no brake!*

The *Distributor* is a fully tested unit. All parts are over size for extra strength and the entire assembly is a rigid, all steel, all welded unit.

Here again is proof—it pays to buy *Industrial*.

SIZES:

The Industrial *Distributor* is available in 700# and 1500# capacities. 2, 2½, and 3 ft. lifts available in each size.



★ Write for Descriptive Bulletin

Industrial EQUIPMENT COMPANY

115 N. OHIO ST. MINSTER 2, OHIO

(*Concluded from page* 164)

patterns and matchplates, and ha brought average production per mold er to 250 to 300 molds per day.

Molding stations are provided sand from overhead hoppers fed from a new central sand conditioning system, and molds are set out on roller conveyors for pouring.

The company maintains close control over all of its manufacturing operations. This involves not only metallurgical and sand testing in the foundry, but also the checking of raw materials and the examination of all products under service conditions. A complete chemical, electrical and mechanical laboratory is maintained for this purpose in charge of a graduate metallurgist and chemist.

Machine Molding

(*Continued from page* 77)

instead of merely jolting the flask or box, a great many small and medium sized jolters are equipped with supplementary air cylinders that raise the table and squeeze the sand in the mold against a rigid squeezer head so mounted that it can be quickly swung out of the way when not in use. In certain designs, too, the head can be pressed down on the sand by means of air-operated cylinders and pistons. In operating jolt-squeezers of the smaller sizes, the molds are lifted and rolled over by hand. These machines are extensively used for ramming up molds from double-faced matchplates, either in strip or snap flasks, or in light aluminum flasks of the usual type.

When the pattern requires a fairly deep flask, and contains narrow pockets into which the sand must be tightly rammed, jolt squeezers are far more satisfactory than either plain squeezers or jolters. As already explained, the former will not pack the sand thoroughly against patterns of this type, and jolters not only make butting off necessary but also loosen the sand in the drag while the cope is being rammed. With jolt-squeezers, the final squeeze presses the sand in the drag back against the matchplate, and thus remedies the damage done while jolting the cope.

In making molds on jolt-squeezers double faced with matchplates, the drag is first simply jolted, and a bottom board, which fits inside the flask, is put in place. Board, flask and matchplate are then rolled over, and the cope flask set in position, filled with sand and jolted. This packs

(*Continued on page* 168)

For Uniform, Low Cost, Efficient Blast Cleaning

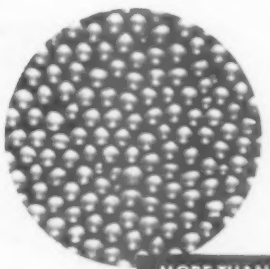
METALLIC

SHOT HI-GRADE GRIT

When you buy shot and grit, you buy a promise of uniform, low cost, efficient blast cleaning or peening. Your confidence in the material ordered should be based on actual use, rather than recommendation or reputation. Its true value to you can only be determined by a thorough test in your equipment, on your job.

To all outward appearances, most shot and grit may appear to be the same—but, that's where the similarity ends. Where Hi-Grade Shot and Grit are concerned, you'll find there IS a difference . . . a value far beyond purchase price that pays out in extra performance on *your* job. Hi-Grade Shot and Grit is *quality-controlled* from molten metal to finished product. Order a trial quantity today. Let results convince you *Hi-Grade is best by test.* That's the only practical and profitable way to buy abrasives.

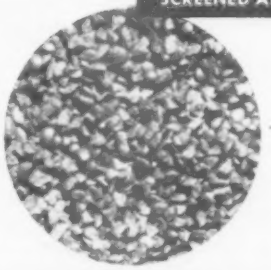
PACKED IN 100 LB. BAGS
READY FOR IMMEDIATE SHIPMENT



HI-GRADE SHOT
UNIFORM SIZE AND HARDNESS

Withstands repeated strain, stress and wear. Famous for its lack of hollows, tails, irregular shapes. Exclusive alloying and tempering process prevents rust and minimizes impact fractures.

MORE THAN MEETS S.A.E. SPECIFICATIONS
SCREENED AND GRADED FOR 100% USAGE



HI-GRADE GRIT
SHARP, TOUGH AND DURABLE

Made of same material and processed by same methods as Hi-Grade Shot. Free from dust fines and scale. Cleans with maximum efficiency. Easy on equipment—reduces wear and maintenance costs.

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MANUFACTURERS OF *QUALITY-CONTROLLED* SHOT AND GRIT

Representatives in Principal Cities

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(*Continued from page* 166)

the cope sand tightly enough so that the riser patterns and gate stick can be removed without allowing much sand to fall into the openings thus left. If necessary, loose sand is poured into these spaces before squeezing the mold. In some cases, too, the special gate sticks described earlier can be used to advantage, since they do not have to be removed from the sand before squeezing the mold.

Finally, drag, matchplate and cope are squeezed between the table of the machine and the squeezer head. Since both the squeezer head and the bottom board fit inside the flask, this operation packs the sand tightly in both drag and cope. The handling of the mold from this point on is exactly the same as has already been described in discussing plain squeeze machines. As there mentioned, the cost of the equipment required for strip or snap flask molds is so low that they are almost always used in preference to other types of flasks, for making small castings from matchplates.

The advantages of jolt-squeezers, already enumerated, are of course not confined to the small machines used to make strip or snap flask molds. Larger patterns, mounted on separate cope and drag boards, which have deep pockets or vertical surfaces, are advantageously molded on these machines. The jolting feature gives a good ram in the pockets and in the lower parts of the mold, while the final squeeze compacts the sand in the upper portions without the necessity of using heavy plates on top of the mold, or extra sand that must be struck off after jolting is complete. In this way not only is butting off made unnecessary, but the sand throughout deep molds is more evenly compacted than when plain jolters are used.

It is impossible, of course, to use integral grids on the drag flasks when the molds are rammed on jolt-squeezers, and whenever possible the sand is struck off before the bottom board is set on. To do this it is necessary to leave enough sand so that the board just clears the flask when squeezing is complete. On copes it is not necessary that the top of the sand should be just at the level of the edge of the flask, so that it is not essential that just the right amount of sand be left on. In squeezing barred copes, however, a plain squeezer board cannot be used, but special ones must be provided with protruding portions that straddle over the bars of the cope and compress the sand between them.

The molds on these larger machines are sometimes handled with suitable hoists. For really fast production, however, jolt-squeezers with pattern-drawing attachments are widely employed. Either the roll-over or the pin-lift types may be used, depending upon the sort of work being handled. Drags and deep cores that are difficult to draw are most advantageously made on the roll-over type, while shallower copes that require little if any patching or core setting are best suited to the pin-lift devices. On the highly specialized machines designed for high production work, such a matter as striking the sand off the drag at the correct level is provided for by means of a pivoted strike-off bar mounted on the machine and adjustable for different heights of flask.

Jolters and jolt-squeezers used for production work, with mechanical pattern drawing devices either integral or mounted on the same foundation, are usually set up in pairs, one machine being used to ram drags while the other turns out copes, as shown in Fig. 24. Conveyors of some sort, as shown in the illustration, are often provided to move the rammed-up flasks to a station where men known as finishers patch any broken corners of the mold, slick down the sand, place internal chills, make the necessary vents, and so on. If no drying is required, the cores are set at this time and the copes are placed and clamped down. If complete or partial drying is necessary, the flasks are either transferred to the ovens, or allowed to set long enough for air drying to take place. In some cases, heaters

(*Continued on page* 170)

NORTHEASTERN OHIO Chapter of the AFS held its annual golf outing at Pine Ridge Country Club, Wickliffe, O., June 24. Photos are by courtesy of Sterling N. Farmer, Sand Products Corp.

Installed in 1937

and still competitive and highly efficient today

BOTH past and present performance of the Bartlett-Snow equipment in the grey iron foundry of this large mid-western automobile manufacturer, demonstrates the ability of Bartlett-Snow engineers to accurately analyze foundry problems, and then design, build and install equipment that will repay its initial cost within a short time,—and return handsome profits to the purchaser for years and years thereafter.

The shakeout and spill sand in this foundry is collected on conveyors in the basement, passed through a rotary cooling screen, mulled and aerated. The prepared sand is then handled on an inclined 24" belt conveyor (see view above) eliminating the need for bucket elevators, and distributed over the fly wheel line molding machines. Sand not needed by the eight molding station on the fly wheel line is carried to the head line on a cross belt, thus permitting sand to be distributed to two complete loops. The continuous mold conveyor loop shown above consists of 95 cars of Bartlett-Snow's heavy duty, two axle, four wheel design with steel plate tops 20" wide with 5'-0" centers.

Let the Bartlett-Snow foundry engineers, with their long and intimate experience with the needs of practical day to day foundry operation, work with you on your next sand, mold, or castings handling problem. It's your assurance that all equipment will be designed to adequately serve both present and future needs; and synchronized and coordinated into an efficient, compact, profitable and easy to operate unit. The C. O. Bartlett & Snow Company, Cleveland 5, Ohio. Engineering representatives in New York, Baltimore, Detroit and Chicago.

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CLEVELAND 5, OHIO

DESIGNING AND CONTRACTING ENGINEERS

For the Foundry Industry

SAND, MOLD AND CASTINGS HANDLING EQUIPMENT

"A CLEAN FOUNDRY is an efficient foundry." Everything in its place, ample room to move about in handling the work. Accidents minimized, output increased, you can well visualize the steady, uninterrupted pouring of metal in a plant like this.

On this point Crucible Melters' Handbook may help you: a handy little volume that is intensely practical. Sent free, of course. Just write for it.

* Plenty of room to move through unobstructed aisles makes it easy to pour directly from the crucible that only a few moments before was in the furnace. U. S. Naval Gun Factory, Washington, D. C.

CRUCIBLE MANUFACTURERS ASSOCIATION
90 WEST STREET
NEW YORK 6, N.Y.

(*Continued from page* 168)

may be used to partially dry the molds without placing them in an oven.

As already mentioned, drags are generally made on machines with roll-over pattern drawing attachments since they are then delivered in the position in which they are closed and poured. Small drags, however, especially shallow ones, are sometimes handled with pin-lift devices, and rolled over by hand. Copes that can be set on the drags without requiring patching and other fixing up by the finishers are also lifted by means of these devices. When much work has to be done on them, it is obviously desirable to use a roll-over machine for the copes also. Large ones, to be sure, can be set on horses and patched up from underneath, but at best this is an awkward and unhandy way of working and is therefore seldom resorted to except for very large flasks that are not handled by mechanical pattern draw devices, but lifted with the overhead crane.

Many Machines Available

The possible combinations of types of machines and of pattern drawing devices for molding different sorts of castings is almost endless, and before choosing the equipment for a long run of repetition work, the foundryman is well advised to consult with the makers of a wide variety of molding machines who are in a position to recommend the ones best suited to the job in hand. In this sort of work drags may be made on a machine of one type and copes for the same casting rammed on a companion machine of a different kind. Shops that have to handle a wide range of patterns, and can expect only comparatively short runs of molding machine work, as a rule will install jolters or jolt-squeezers with roll-over pattern draw attachments for all but the smallest casting; for matchplate production of small castings in strip or snap flask molds, jolt squeezers are almost always selected. When a great many cores of medium or large size are to be made, either plain jolters or jolt roll-over machines may be used to advantage.

A number of steel foundries using jolters and jolt-squeezers with roll-over pattern drawing devices have experienced troubles with shifts, which are more apt to occur with this type of equipment than when molds are made on the bench or floor by hand. This is particularly true of jobbing foundries that do not use their flasks continuously, but are

(*Continued on page* 172)

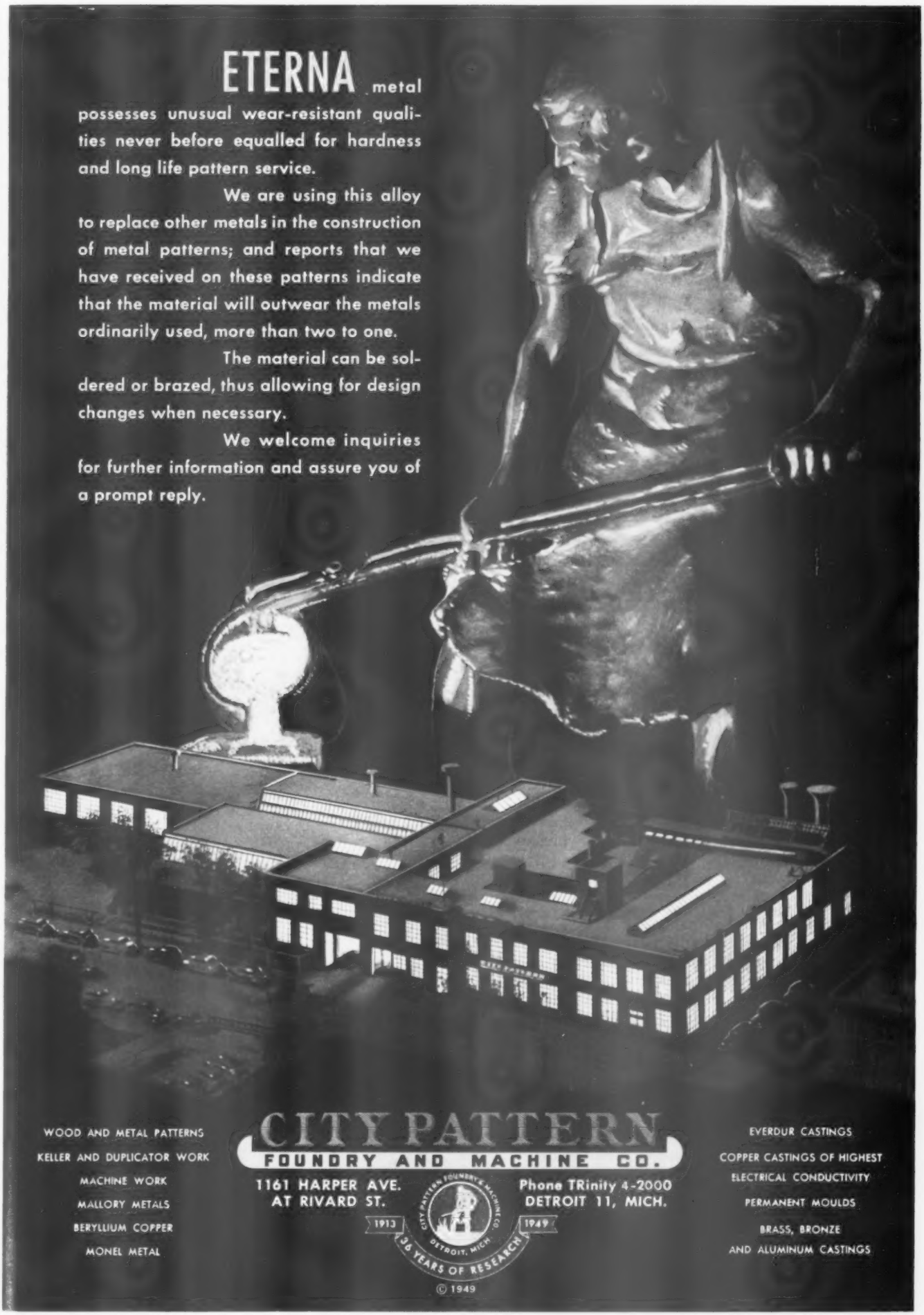
ETERNA metal

possesses unusual wear-resistant qualities never before equalled for hardness and long life pattern service.

We are using this alloy to replace other metals in the construction of metal patterns; and reports that we have received on these patterns indicate that the material will outwear the metals ordinarily used, more than two to one.

The material can be soldered or brazed, thus allowing for design changes when necessary.

We welcome inquiries for further information and assure you of a prompt reply.



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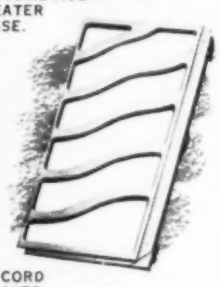

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REVOLUTIONIZING PRODUCTION WITH HYDRAULICS SINCE 1877

(*Continued from page* 170)

obliged to store them out of doors, so that the pin holes get rusty and out of shape. Smaller flasks with pins attached to the drags suffer even worse, since both pin and pin hole then are affected. In high production work, where a single set of flasks is used over and over for days and weeks on end, the pins and pin holes can be kept in shape so that they fit closely and shifts are held to a minimum. The jobbing foundryman, however, often finds himself obliged to decide whether to put flasks to work with badly-fitting holes, or to spend time and money to bush them anew. To minimize shifts, the flask should not be used if the pin fit is poor, but there are times when the rule must be violated and other means employed.

Blocks Prevent Shifts

The commonest method used is to place core prints on the cope and drag boards, and to set what are called shift blocks in the drag impressions before setting the cope in place. These blocks are in the shape of double-faced truncated pyramids or cones, the sloping faces serving to guide the cope into proper position as it is lowered. In some cases, the blocks are made of cast iron, in others hard dry sand cores are used. Whatever materials are used, it is essential that they conform closely to dimension, so that they fit accurately in the core prints, and that the latter should also be of the correct size and properly located. Obviously, too, if these blocks are to be depended upon to guide the copes into position, the fit of the flask pins must be quite loose, and the pins used only as a rough means of positioning the two parts of the mold, since it will generally be impossible to have both the pins and the shift blocks exactly located so that both act to set the cope in its proper place.

As a rule, on the larger sizes of molds made from cope and drag boards, both cope and drag flasks are provided with drilled or bushed holes at both ends which fit over pins set in the pattern boards or well boards. At one end, the holes in the flasks are round, at the other oblong ones are used, to compensate for change in dimensions of the flask with variations of temperature. In closing the mold, loose pins are used to bring the cope and drag into proper relative position, and these pins are, or should be, left in position until the mold has been clamped together and moved to the place in which it is to be poured.

In closing a mold, it is often pos-

(*Continued on page* 175)

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RELIABLE REFRACTORIES
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(*Continued from page* 172)

sible to look down one or more heads and make sure that the two parts of the impression in the sand meet properly. The same purpose may sometimes be served by mud balls set along the edge of the impression in the drag. These are inspected after the cope has been set in place and clamped down, and then unclamped and lifted off. If the cope has shifted on the drag, the mud ball would be unevenly shaped. This method, however, can be employed only when the copes are lifted after being put in position, a practice often followed when it is desired to check the thicknesses of metal that will be secured over cores, by means of mud balls placed where chaplets are to be set to hold the cores down. In this case, the mud balls are measured after the cope is lifted, to be sure that the metal thickness is to be correct.

Good Maintenance Helps

In general, shifts can be prevented only by keeping the equipment in good condition, and by checking constantly to be sure that pins and pin holes are of the correct size and properly located. The amount of shift that can be tolerated, will vary widely with the size and shape of the casting and the thickness of its sections; what would be unacceptable in the case of one job being perfectly satisfactory in another.

As already mentioned, molding sand suitable for steel foundry work is far from a free-flowing material, so that neither a squeezer nor a jolter will force it to move much in a horizontal direction. In designing patterns and coreboxes for machine molding, therefore, back drafted areas, even if they can be taken care of by means of loose pieces, should be avoided as far as possible, because the sand in contact with them is certain to be much more loosely rammed than that in the rest of the mold. The soft-rammed spots thus set up are a constant source of trouble, giving rise to over-sized or "swelled" places on the casting, "penetrated" and adhering sand, washed-away parts of the mold that cause sand spots elsewhere in the casting, and other similar difficulties. Even a very small projecting portion of a pattern or of the side of a corebox, with correctly-tapered areas above and below it, is apt to produce a soft-rammed place in the mold and the troubles that result from it. In hand ramming, some of these places can be taken care of by proper manipulation of the rammer, but squeezers and jolters pack the sand chiefly

(*Continued on page* 178)

Below: Battery of EF Gas-fired Batch Type Furnaces in Steel Foundry showing Gantry Crane that Loads, Removes and Quenches Heavy Railroad Castings.

EF Builds a Size and Type of Furnace for *Every* Foundry Heat Treating Requirement

● Whether yours is a steel, grey iron, malleable or non-ferrous foundry—there's a size and type of EF furnace that's exactly suited to meet your specific requirements. EF builds all types of furnaces in sizes for most any capacity,—oil-fired, gas-fired or electrically heated. Consequently we can recommend *without prejudice* the design, the size and the method of firing that suits *your particular problem best.*

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For the maximum in low cost, efficient operation it will pay you to investigate recent EF furnace developments. Write for the Bulletin "EF Foundry Furnaces" and call in the EF engineers on your next annealing or heat treating job.

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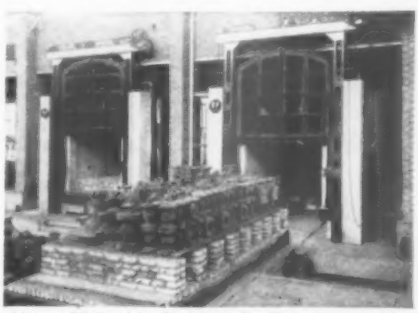


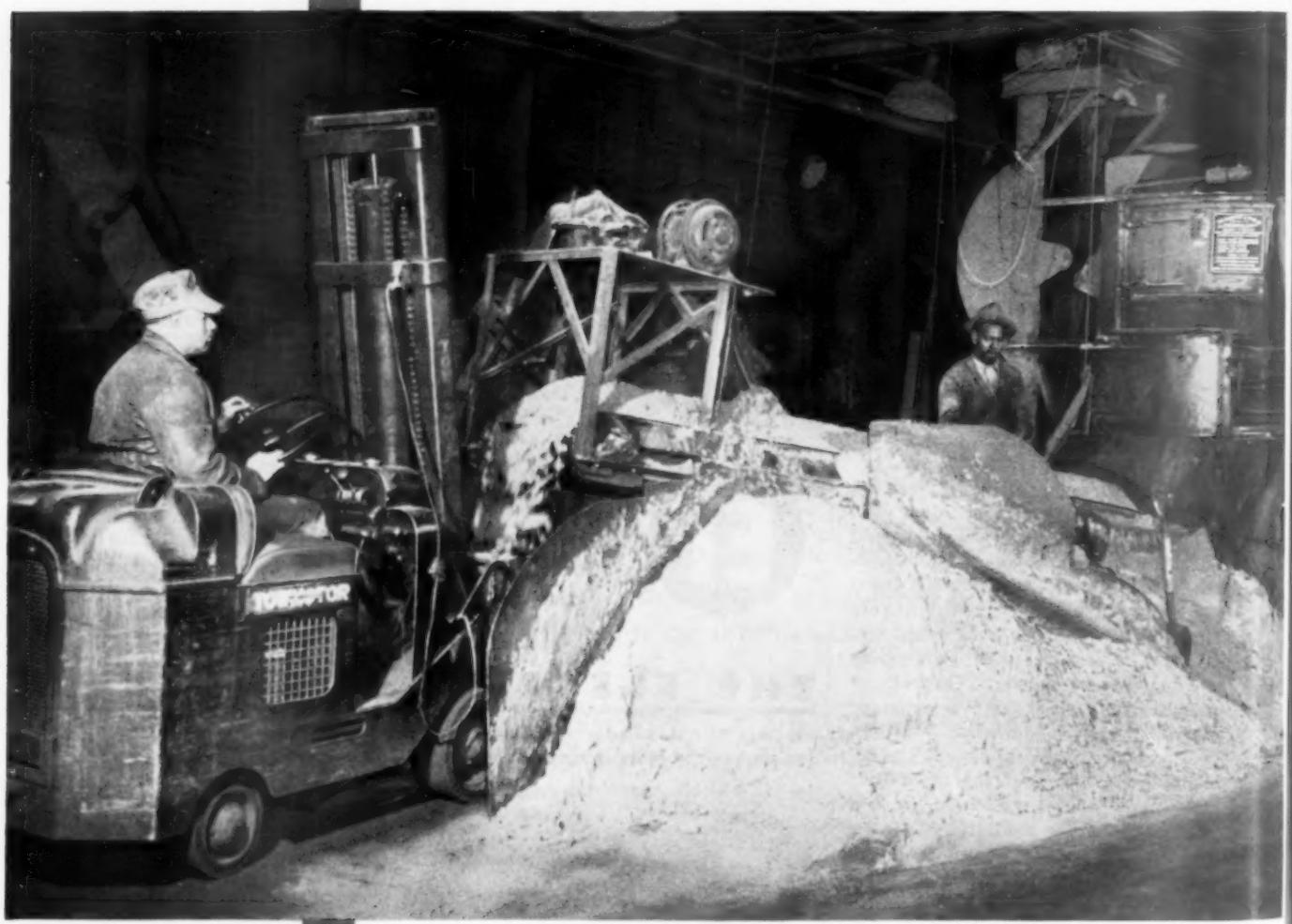
Above: EF Double Chamber Car Type Furnaces for Annealing Castings, Equipped with Three Furnace Cars and One Transfer Car, Incorporating Car Puller.

Above: Two EF Roller Rail Pusher Type, Short Cycle Malleablizing Furnaces—Capacity 40,000 lbs. of Scale-free Annealed Malleable Castings per Day.

SPEEDMULLORS

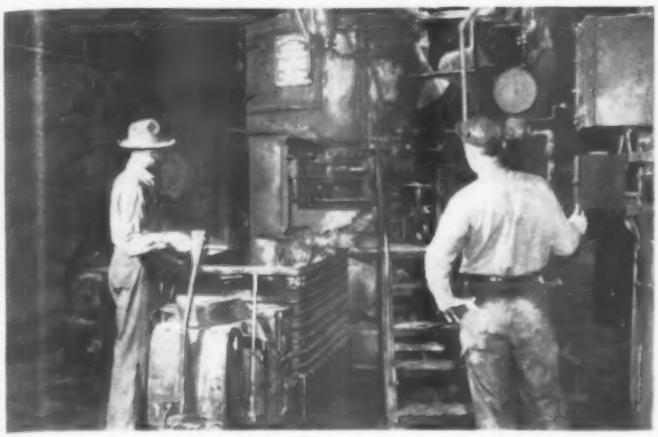
HELP FERRO

keep pace with the



A Model 60 Speedmullor mulls and cools 125 tons of core sand per day. The mulled core sand is discharged from the Speedmullor onto the conveyor belt and delivered to a waiting electric truck or plowed off at the side for later use.

This Model 60 Speedmullor discharges a 10 cu. ft. batch of completely mulled and cooled sand every 110 seconds. Like the other Model 60, it is automatically controlled and mulls and cools 125 tons of core sand a day.



the automotive industry

Ferro Machine & Foundry, Inc., Cleveland, Ohio, supplies the automotive plants with up to 500 tons of castings per day. Two Model 60 Speedmullors supply the 250 tons of core sand required daily. To control moisture, the sand is dried immediately before mulling and the sand entering the Speedmullors is very hot. The Speedmullors cool this hot, dry sand to within ten degrees of room temperature, as the sand is mulled to Ferro's exacting specifications, during a 70 second mulling and cooling cycle. The complete operation from loading to discharging, is automatically controlled and requires only one minute and fifty seconds per batch, as compared to twenty minutes required by the old conventional mixers for mulling alone.

Ferro's facing sand is mulled in three, automatically controlled Model 40 Speedmullors. 130 tons of synthetic facing is required each day for the various molding floors and for a loop molding unit.

Operations at Ferro are fully described in the January 1949 issue of our magazine BETTER METHODS—copies are available on request.

Two Model 40 Speedmullors mull 290 batches a day of heavy synthetic facing. The thoroughly mulled sand is discharged into tote boxes which are carried by electric truck to the molding lines.

Another Model 40 Speedmullor at Ferro mulls all the facing sand for a high speed molding line. The three Model 40 Speedmullors mull 130 tons of facing sand per day.

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PETTIBONE MULLIKEN CORPORATION

2424 NORTH CICERO AVENUE, CHICAGO 39, ILLINOIS

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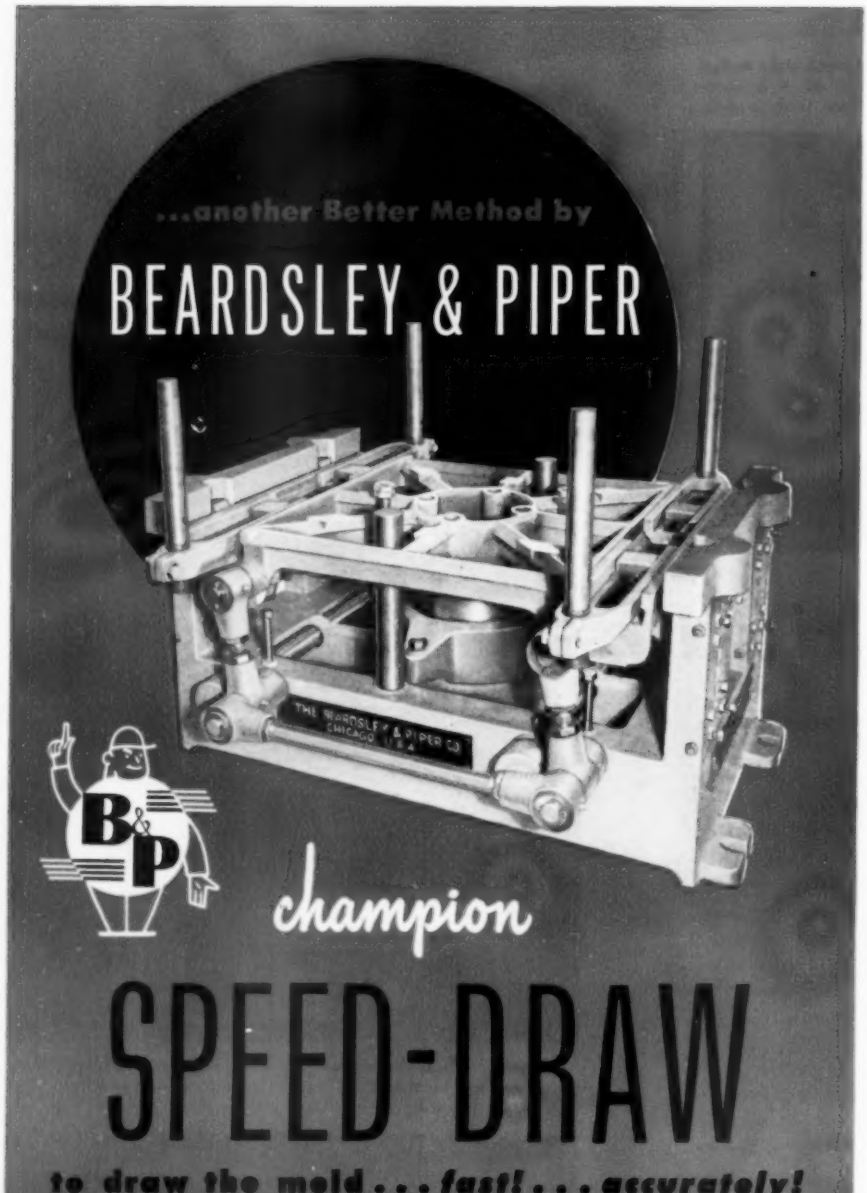

The air operated, Champion Speed-Draw lifts either cope or drag mold quickly, smoothly, and economically. Pattern mounting is simplified and pattern changes are made with a minimum of interruption to production.

There are eleven Champion Speed-Draw Models—both stationary and portable — to cover a maximum range of flask sizes. Adjustable lifting pin brackets permit the use of a wide range of flask sizes on each model. Get complete information on the Speed-Draw now!

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(*Continued from page* 175)

in the vertical direction, and to do ar horizontal ramming with them is a most impossible.

Double-faced matchplates fo squeezer or jolt-squeezer work ar made either of hard woods, or metal, the latter being preferred whe a large number of castings are to b made. The patterns themselves als may be of hard wood if only a mod erate number of castings are to b made, or of metal when they ar to be produced in large quantities. Metal plates and patterns naturally greatly out-wear wooden ones, and do not warp or change dimensions in storage as even the best of woods will do. In the long run, therefore, metal equipment is the most economical for the production of standard pieces which are to be made in large quantities.

Use Plaster for Small Patterns

Plaster and other similar substances have long been used for small mounted patterns and for seating wooden patterns on light followboards. These materials are easily, cheaply and quickly made into patterns, and so are quite satisfactory for hand bench and squeezer work. Being comparatively weak and brittle, however, they do not stand up well in the rough service to which matchplates are subjected on jolt-squeezers, and their use in machines of that type has been chiefly for orders calling for a limited number of castings.

The production of metal patterns is naturally a time-consuming operation, involving as it does the making of a wooden pattern, the ramming up and pouring of the necessary molds, and considerable machining and polishing to bring the finished article to shape. To wait for metal patterns to be made and mounted may sometimes mean the loss of an order, and the industry has long been in need of a method of quickly making patterns out of a material that will last like metal, by methods similar to those used for plaster ones. The development of various plastic materials now promises to fill this long-felt need in a satisfactory manner. So far, no material has been developed, strong and light enough to make the whole matchplate with integral patterns, but most ingenious methods have been worked out to quickly and firmly mount plastic patterns in wooden or metal boards without the use of screws or nails.

Poured in master plaster molds made from a wooden pattern, the plastic parts can be made complete in a matter of hours, require no machining other than that needed fo

mounting them in the plates, and are said to be so smooth and resistant to the sand that they give a perfect draw without the use of any parting compound whatever. Like the plaster molding compounds, they can also be used to make follow boards or ram-up boards for small loose patterns of intricate shape that would be difficult to mold without a board. The plaster master molds are kept in storage, so that a damaged pattern can be quickly replaced on the board.

Large mounted patterns for jolter and jolt-squeezer work, which are to be used many times over, are in all cases made of the best woods or combinations of hard wood and metal parts, so as to resist the abrasion of the sand. The cope boards in particular are subjected to very severe wear because of the gaggers. Though the latter are sometimes set on top of the first inch or so of facing, they work down as the flask is jolted until they bear on the pattern and pattern board, and tend to cut into them severely. For his reason, metal, rubber or composition sheeting is often used to protect the parts of the pattern and board subjected to the greatest abuse, and for standard parts made in sufficiently large numbers it may pay to make all, or at least a large part of the pattern of metal or strong plastic.

(To be concluded next month)

Offers Films

DoAll Co., Des Plaines, Ill., is offering eight industrial films available on a free loan basis for group showings. For large audiences, company technicians will participate as speakers and to demonstrate machine tool equipment.

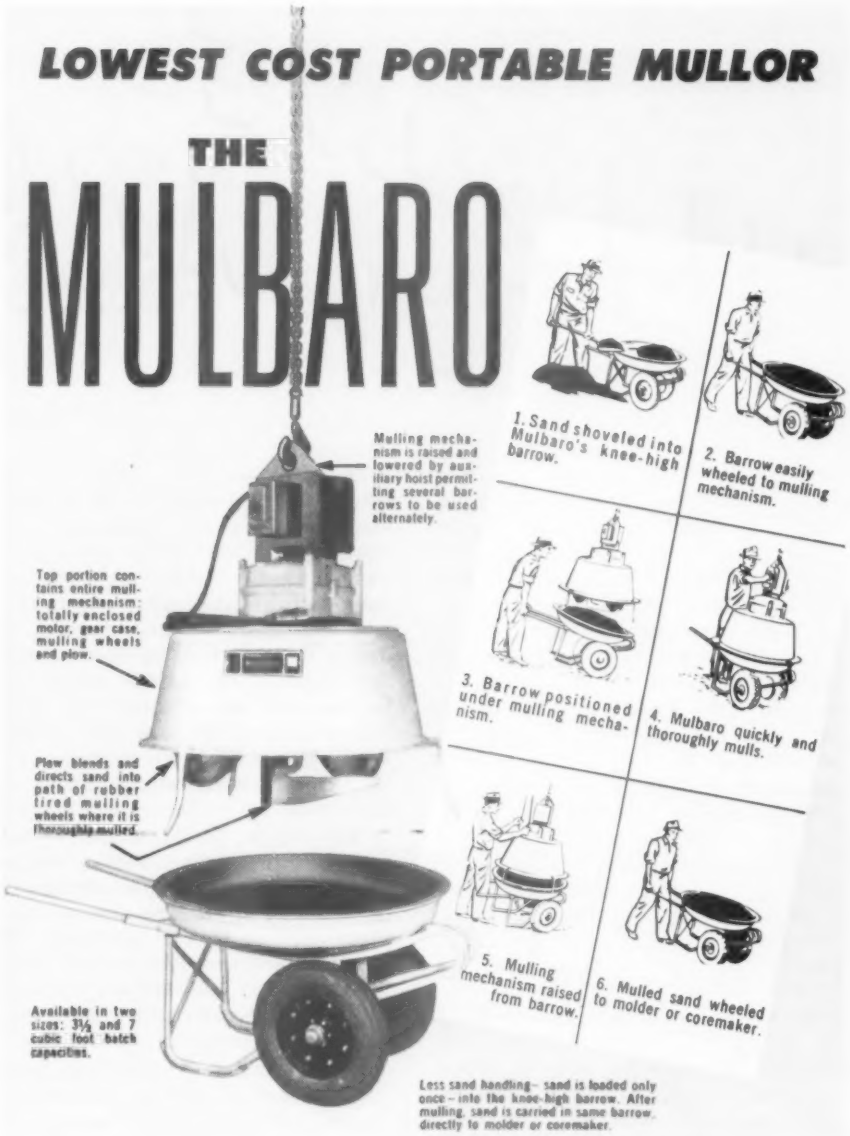
Titles of the films are: "The Versatile Contour Saw;" that film also includes a sequence on friction sawing. "Sawing an Internal Irregular Shape," "Filing an Internal Irregular Shape," "Gage Blocks and Acessories," "How DoALL Gages Are Made," "The Theory Behind the Use of DoALL Gages," "How DoALL Gages Are Used," and "DoALL Precision Accuracy with the DoALL Inspection Laboratory."

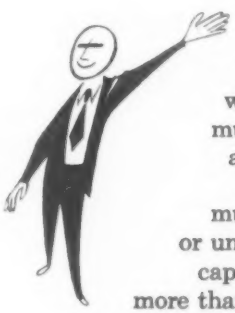
Stress Analysis

Society for Experimental Stress Analysis will hold its annual meeting at Hotel New Yorker, New York, Nov. 30 and Dec. 1 and 2. Inquiries should be addressed to the society at P. O. Box 168, Cambridge 39, Mass.

LOWEST COST PORTABLE MULLOR

THE MULBARO


Mulling mechanism is raised and lowered by auxiliary hoist permitting several barrows to be used alternately.
Top portion contains entire mulling mechanism: totally enclosed motor, gear case, mulling wheels and plow.
Plow blends and directs sand into path of rubber tired mulling wheels where it is thoroughly mulled.
Available in two sizes: 3½ and 7 cubic foot batch capacities.
1. Sand shoveled into Mulbaro's knee-high barrow.
2. Barrow easily wheeled to mulling mechanism.
3. Barrow positioned under mulling mechanism.
4. Mulbaro quickly and thoroughly mulls.
5. Mulling mechanism raised from barrow.
6. Mulled sand wheeled to molder or coremaker.
Less sand handling— sand is loaded only once—into the knee-high barrow. After mulling, sand is carried in same barrow directly to molder or coremaker.



The *really* portable Mulbaro is easily moved about the foundry or core room and the sand is mulled in the same barrow in which it is brought to and taken from the mullor. The sand is handled only once! With an additional barrow or barrows, the Mulbaro mulls almost continuously. While the sand is being mulled in one barrow another is being loaded or unloaded. Thus the Mulbaro offers the capacity of two or more mullors for slightly more than the price of one . . .

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SILICONE COMPOUNDS Adapted to

RECENTLY the subject of investigation by western foundrymen for a variety of unusual applications are new-type silicone lubricants.

These are organic silicon oxide compounds developed by Dow Corning Corp., Midland, Mich. Their physical properties include chemical inertness and excellent lubricational stability at extremely high or low temperatures, and they are compounded for use in molds or dies of various types by the addition of solvents, graphite, corrosion inhibitors, etc.

Silicone lubricating compounds are usually brushed or sprayed on the surfaces of solid mold cavities, and in this capacity it is interesting to note that they have even been used to permit the die casting of steel. In sand casting work, they have been used as bonding agents for molding and core sand and as components of facing materials.

Properties of the compounds are, of course, variable. However, the following may be considered as typical:

Freezing point	−8° F
Flash point	610° F
Viscosity (centistrokes, 77° F)	480
Viscosity temperature coefficient	0.86
Gelation time (hours at 482° F)	1200-2000
Expansion coefficient	0.40
Refractive index (77° F)	1.52
Specific gravity (77° F)	1.10
Weight (lb./gal, 77° F)	9.18

Most of these properties were ascertained in conformity with standard ASTM petroleum tests, and indicate eight to ten times the lubricational efficiency of average petroleum lubricants.

Hisgen Machine Tool Works of Los Angeles—now operating as the Ohio Machine Tool Works, 833 West Davis St., Dallas, Tex.—has more or less pioneered in the use of silicone lubricants for the pressure die casting of steel products. The machine employed in this work is of a special design, based on confiscated German patents of World War II. It employs an electric induction furnace to melt the metal which feeds, via a hopper, a steel injection cylinder, from which a hydraulically-operated ram forces the molten metal through a ⅜-in. nozzle into a closed die cavity. An end view of the machine is shown in Fig. 1, with a sketch of its details shown in Fig. 2.

The hopper and injection cylinder components of the machine are preheated to temperatures sufficient to retard cooling of the molten metal until the shots can be made. The forged steel dies are sprayed with a thin silicone lubricating film prior to each injection. This film subsequently is dissipated by the heat of the metal, but it provides just enough parting action to prevent damage to the die cavity and permits the dies to be reused as soon as a new film can be applied.

Steel die castings produced to date have weighed up to 15 lb, but it is claimed that production of larger castings is practical by this method. Most of the castings made have been the carbon steel grade, although various parts have been cast of nickel and chromium alloy steels, including such products as hypodermic needles, hand wrenches and engine shafts.

In die casting lower temperature metals, and also in injection molding operations and in permanent mold casting work, silicone films are frequently termed "permanent lubricants" because a single coating can serve as the parting medium for a series of shots. Temperature range of metals in these operations is such that the lubricant is not dissipated as in the case of molten steel. In addition to their high-temperature resistance, silicone lubricants used in metal dies or permanent molds have the desirable property of not oxidizing or "gumming" the surfaces of the mold cavities.

Use of silicones in sand casting practice still is limited, but applications have been developed as a

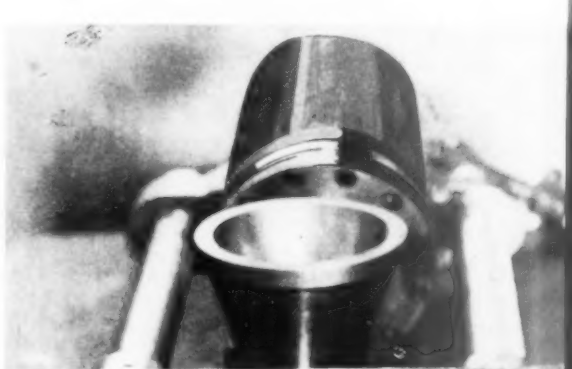


Fig. 1—View of the Hisgen steel die - casting machine. In the foreground is the steel injection nozzle. Behind the nozzle is the hopper in which molten steel is poured prior to actuation of the hydraulic injection mechanism (background)

Fig. 2 — Schematically shown here are details of the die casting machine. Dies are silicone-lubricated

By THOMAS A. DICKINSON

to Foundry Use

bonding agent for both molding and core sands and as mold facing materials. An advantage claimed for the silicone bond is that the sand mixture requires no moisture addition. In instances where a dry sand mold is employed this eliminates the drying operation on the completed mold, although the base sand itself is dried prior to the silicone addition.

Cores made of silicone-compounded sand likewise can be used without baking; the fluid silicone components do not produce gases or steam to present a problem on this score when in contact with hot metal. While simple or symmetrical sand cores can be made from mixtures of dry sand with a silicone product alone, with more complicated shapes it is desirable to add other binders to give greater strength while the cores are being handled.

In addition to their use as a component of mold and core sand, mixtures, silicone resins have been separately compounded with charcoal powder, graphite, etc., to serve as refractory facing materials for both green and dry sand molds.

When flexible molds are required —as in the production of low-melt alloy castings—silicones may serve either as plasticizers, which will increase the temperature resistance of the mold materials, or as separate lubricating mediums for the mold cavities. Generally speaking, they are preferable as plasticizers for natural and synthetic rubbers, which can be vulcanized or heat-hardened. They will not normally combine with hot-melt thermoplastic materials, but may be added to the latter in a molten state to serve as "bleed lubricants" (that is, lubricants which will sweat or exude slowly from the surfaces of solidified molds.)

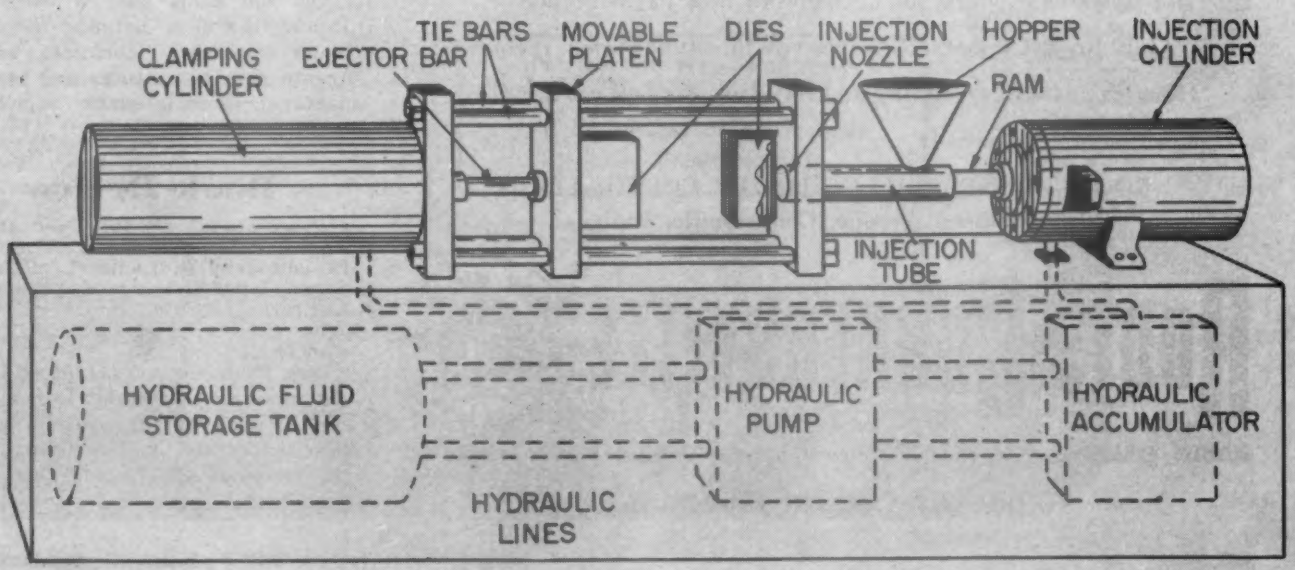
Silicone resins are also being used in compounding heat-resistant sealants for the pores of metallic castings. Such sealants are normally applied by spraying, brushing, or dipping—after which they may be solidified by heating to temperatures of 200 to 500° F. for an average time of about 30 minutes.

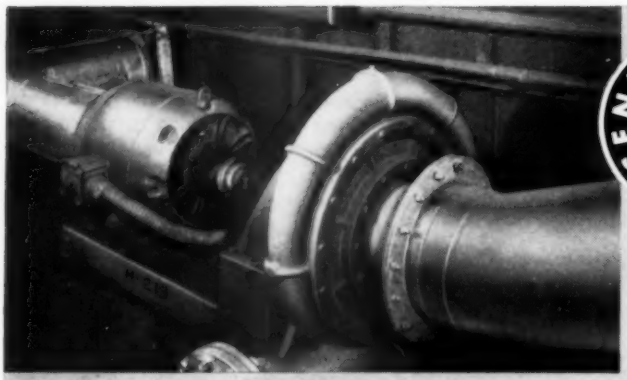
To some extent, silicone lubricants are being used in place of petroleum lubricants to oil or grease the moving parts of machines and tools whose high operating temperatures or related characteristics necessitate exceptional lubricational efficiency. However, because the silicones are still rather new and comparatively expensive, it must be noted that they are not being extensively employed where other materials can give comparable results.

As industrial materials silicones are relatively new. It was only in the early 1930's that Dr. J. F. Hyde of the Corning Glass Works developed the first flexible silicone resin to seal the voids in fibrous glass cloth. New applications for the various forms in which silicones are available steadily are being discovered.

Following are some of the various Dow Corning silicone fluids, com-

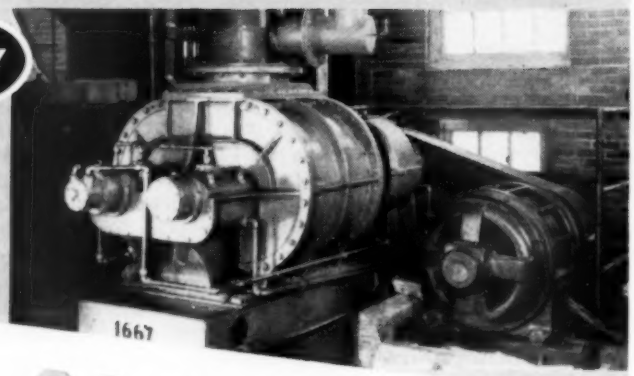
Fig. 3 — Sand cores, made by compounding silicones and other materials. They appear to be green but contain no moisture and can be used without preliminary heating





R-C Centrifugal Blower, type OIB, in foundry service. Capacity 6,000 CFM, at 21 oz. pressure.

ROTARY



R-C Rotary Blower, type RCD, capacity 6,200 CFM.

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If you are in doubt about whether Centrifugal or Rotary Positive units will do the best job of handling cupola air on any specific application, you can obtain an unbiased answer from R-C *dual-ability*.

Because we build both types, in wide ranges of sizes and designs, we can make sound comparisons and can recommend without prejudice the units whose capacities, pressures, drives and other characteristics deliver the best performance.

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pounds, resins, varnishes and lubricants, together with their principal uses, which are available:

DC 702 and DC 703 for use as high vacuum diffusion pump oils are stable to air and moisture at operating temperatures of 175 to 225° C.

DC 1107 is used as a durable water repellent treatment for fabrics and other organic materials.

DC 4 compound is a nonmelting silicone paste used as a moisture-proof insulating material for internal combustion engine ignition systems and for sealing disconnectible junctions in radio, radar and television units.

DC Antifoam A is effective in very low concentrations as a foam killer in aqueous and certain nonaqueous systems.

DC 933 and DC 996 electrical insulating varnishes are said to have at least ten times the life and ten times the wet insulation resistance of the best class of insulation previously known.

DC 801, 802, 803 and 804 are used in formulating heat and weather resistant coatings for boilers, stacks, ovens and other hot metal surfaces. Certain modified silicone aluminum paints withstand temperatures in the order of 1000° F.

DC 2103 is a thermosetting silicone resin having high heat stability and excellent dielectric properties. It is used as a bonding agent for inorganic fabrics in molding rigid laminates for electrical applications.

DC 550 and DC 710 are used as lubricants for conveyors, oven clocks, parking meters and other instruments and bearings exposed to high temperatures, high humidity or outdoor weathering.

DC 33, 41 and 44 are greases. DC 33 is used for very low and high temperature operation; DC 41 for very high temperature low-speed operation, and DC 44 for high-temperature, high-speed operation of anti-friction bearings.

DC 200 fluids have a variety of applications as a damping media, as liquid dielectrics, lubricants, release agents, and as coatings and impregnants to provide water repellency.

Book Review

Proceedings of the Institute of British Foundrymen, Vol. XLI, 1947-48, edited by G. Lambert, cloth, 355 pages, 7 x 9¾ in., published by the Institute of British Foundrymen, St. John Street Chambers, Deansgate, Manchester, 3.

The *Proceedings* contain the papers presented at the 45th annual general meeting of the institute and a selection of the papers presented at the branch meetings held during the session 1947-48.

Brief Notes for Busy Foundrymen

DENSITY • Its Significance in Proper Sand Control

Density isn't a new word, but its importance is being studied in the foundry and more consideration is given the term. Density is defined as, "The ratio of the mass of a homogeneous portion of matter to its volume", or, "The computing of weight per unit volume".

The density of sand, after it is rammed into the flask, has a decided influence on other physical properties. With a dense sand, green strength is increased and permeability decreased. Mold hardness is usually increased.

As dense sand weighs more, the foundryman has a splendid opportunity to check this property. For example, weigh two molds, using the same flask, the same pattern, and the same sand. If one mold is heavier, the sand will be found to be less permeable, higher in green strength and greater in mold hardness.

Shops have found it practical to paint a single standard flask a bright color. The results obtained by weighing the cope and the drag from this flask, periodically after ramming, serves as a guide in the determining the density of the rammed sand and in standardizing the number of jolts at the molding machine.

Base permeability of sand depends on the ratio of sizes, the shape, and the arrangement of the particles. If the sand grains appear as spheres of equal diameter, the volume of pore space is about 48% of the total volume for cubical piling, and only 26% if the grain is hexagonal in shape. Comparing selectively graded sand with sand having grains of approximately equal size, the latter requires more clay bond to fill the pore spaces. In the latter, shrinkage occurs until the large grains touch. After that, the plastic portion of the mass continues to shrink between the grains and may crack either in drying or when the metal is poured into the mold. This increases the internal pore space and causes a rough exterior surface due to the projection of the silica grains, between which lie concave surfaces of the plastic bond. Such a condition may cause penetration or burn-in.

With the bentonite portion acting as a film on the sand surfaces, the greatest density is obtained by selective grading, i.e., using the greatest quantity of maximum-sized grains and filling the voids with the next smaller particles that do not crowd or elbow the larger grains out of their most compact arrangement. The intermediate sizes must be removed.

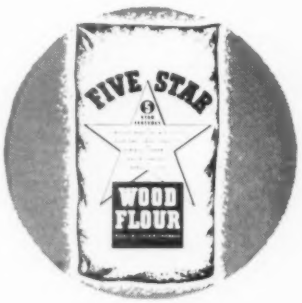
The medium-size sand grains should be the maximum for their position and, in turn, their void spaces filled with smaller particles, etc., until finally the size of the bonding agent is reached. A small percentage of fines does not condemn a sand; it is when the concentration of fines exceeds same limits that trouble occurs.

For many years elder foundrymen have said that sand could not promote metal shrinkage, as shrinkage is attributed only to differences in metal composition. However, many of the elder foundrymen learned that sand does play an important influence on metal solidification, thus aggravating or eliminating certain metal shrinkage conditions.

Proper metal solidification that progresses through the casting in a uniform and equal manner should show no shrinkage if properly fed and chilled in a suitable manner.

It appears from past tests that a dense sand substracts heat faster from a casting than a more porous or open sand, as the porous or open sand acts as an insulator and holds heat, thus creating hot spots which in turn encourages shrinkage. For that reason, many foundries have found it advantageous to use sizable amounts of chills to solidify the metal at a faster rate, thus eliminating the shrink but encouraging hard metal.

Contrary to general belief, an open sand with a high permeability DOES NOT allow the hot gasses to escape. Once the cavities or voids are filled with hot air, the sand then functions as a radiator and since air spaces are poor conductors of heat, the castings usually remain in a more liquid state from open sands than from dense sands which act as chills.



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CLOSE TOLERANCES . . .

(*Continued from page* 94)

are preferred, especially for long-run jobs, their cost is not justified on most short-run work. As a consequence many wood patterns are used but they are made as well as is consistent with amortization over the number of castings known to be required. About 5000 sets of patterns are in active use each month, a large proportion of these having been made in the company's own pattern shop.

One of the most important and unusual divisions of the foundry is called the processing room, Fig. 12. There, decisions are made as to the type of pattern wanted and instructions in this regard are issued to the pattern shop. Patterns from the pattern shop are sent first to the processing room for final checking. Loose wood patterns also are mounted there in pattern mounting composition for machine molding. Such patterns are anchored with eye screws in the material, which is set into cast aluminum frames. It requires an average of about two hours to convert loose wood patterns into those suited for machine molding.

Gates Are Added Later

When patterns are made in the company's own pattern shop no extensions for gates, runners or risers are provided. Such additions are left to the pattern processing room largely because it is under direct control of the foundry superintendent, who decides how gates, runners and risers should be arranged and proportioned to insure sound castings with a minimum number of rejects.

When the pattern is ready, it is sent to the foundry and two castings are made exactly as they would be in regular production.

The two castings are returned to the pattern processing room for rough examination and, if they appear to be satisfactory, one is sent to the x-ray room for radiographing and one to inspection layout for dimensional checks. If these checks reveal that castings are not sound or are not up to specifications in other respects, changes are made in the patterns and another pair of castings is made and similarly checked.

Not until acceptable trial castings are made, are production runs authorized. In effect, the processing room relieves the foundry proper

(*Continued on page* 186)

RIGHT TO THE POINT

Is worry over casting rejects getting you down? Then it's time you knew about

Famous CORNELL CUPOLA FLUX

It has saved more castings than you can shake a stick at, by purifying molten metal, making it hotter and freer flowing, and by reducing sulphur, chilled sides, hollow centers, hard spots, etc.

It keeps your cupolas cleaner, too, cutting down maintenance amazingly.

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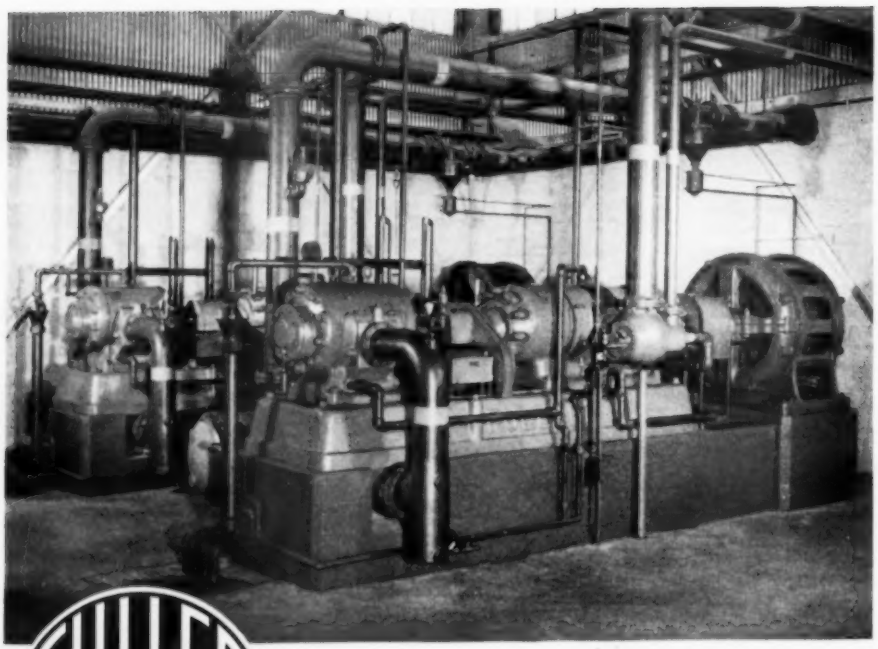
Famous CORNELL ALUMINUM FLUX	*Famous* CORNELL BRASS FLUX	*Famous* CORNELL LADLE FLUX
Produces clean, tough castings. No spongy or porous spots even when more scrap is used. Thinner yet stronger sections are poured. Castings take a higher polish. NO FUMES! Exclusive formula prevents obnoxious gases. Metal does not cling to dross.	Makes metal pure and clean, even when dirtiest brass turnings or sweepings are used. Produces castings which withstand high pressure tests and take a beautiful finish. Saves considerable tin and other expensive metals. Crucible and furnace linings are preserved.	Place a few ounces in bottom of ladle, then tap cupola. Metal is thoroughly cleansed, foreign impurities are easily skimmed off. Ladles are kept clean, there is less patching and increased ladle life. Metal temperatures are retained during transfer to molds.



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Air power in the new cold-reduction sheet and tinplate mill at the Pittsburg, California plant of the Columbia Steel Company is furnished by two Fuller Rotary Two-stage Compressors. Each of these compressors has a capacity of 1660 c.f.m., atmosphere to 125-lb. gage; driven by a 600 r.p.m. synchronous motor. Two 54-in. diameter, 15-ft. high, air receivers, adjacent to the compressors, are used to store the compressed air. Each compressor is equipped with inlet-air filter and silencer units. Complete full-magnetic electrical-control equipment is provided for these compressors, each of the two sets being mounted in dead-front totally enclosed panels. Thousands of Fuller Rotary Compressors are installed in industrial plants giving day in and day out continuous, uninterrupted service, with a minimum of attention and maintenance. We urge you to investigate these efficient, life-time capacity machines.

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C-188

A LIFETIME OF NEW MACHINE EFFICIENCY FULLER

(*Continued from page* 184)

from doing experimental work, except for making the trial castings. If trial castings do not meet requirements, the processing room must find what is wrong and apply the proper remedy. This leaves the foundry proper free to concentrate on production.

A considerable proportion of cores are produced by bench molding but where quantities are sufficient, core-making machines are used. Cores adaptable to blowing are produced on three machines. Other types of cores are made on rockover machines of different sizes. Coreboxes are of wood, wood-and-metal or all-metal construction, depending partly on the production requirements and on the degree of precision required.

Patterns with flat partings are supported on well ribbed perforated drier plates that are machined flat and are carefully handled. Special shape dryers are provided for irregular partings. These are used so that cores retain their shape and to make sure that proper dimensions are maintained. Cores that are deep and require side supports are provided, before baking, with such supports, sometimes in the form of cement-asbestos board plates backed by wedges set against weights.

Cores Transported on Racks

Cores are transferred to racks that are carefully handled in transfer by fork trucks to baking ovens. Cores, though less fragile after baking, are handled so as not to be damaged before use. Baking is done in oil-fired ovens between 350 and 450° F, average baking time being three hours.

After baking, cores are cooled and, when they pass inspection, are shifted either to the molding floor or, in the case of core molds, to an assembly area, Fig. 14. Minor repairs on cores are made but repaired cores must meet dimensional requirements.

Choice, handling and processing of sand is, naturally, on a par with practice in other respects. All molding sand is natural type 80 to 85 mesh. After shaking out and screening in the basement, reclaimed sand is delivered by conveyors to hoppers that feed two mullers, used alternately.

These mullers are on the main floor and discharge onto belts that, after aeration of the sand elevate it to distributing belts leading to hoppers at molding stations. In the mullers, 400 lb reclaimed sand is mixed with 25 lb of new sand, 2½ lb southern bentonite and 3½ to 4½ per cent water, the latter being checked for each batch before delivery to con-

(*Continued on page* 189)

"It's our government of the people by the people for the people"
"Above everything it's reward for individual initiative and enterprise"
"It's our right to choose the work we like"
"It's the machine which multiplies production"
"More than machines it's our philosophy of more goods of better quality at lower costs plus higher wages"
"Free markets and competition made America"

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Yes, each one is right about the U. S. Way...

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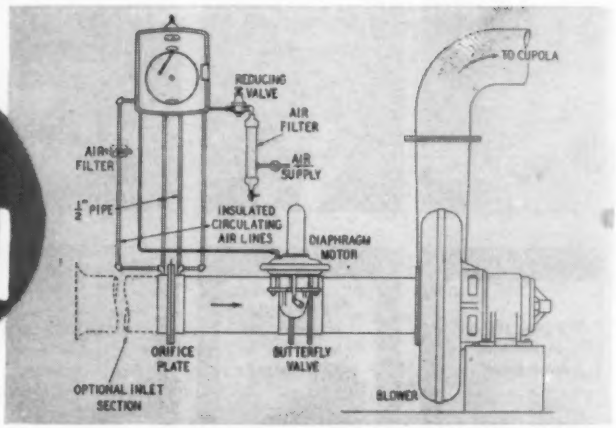

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Here's the new Model-40 Air Weight Controller. Available for either yoke or flush mounting. Flush mounting permits combination with wind box Pressure Recorder and other cupola instruments on central panel.

FOXBORO REG. U. S. PAT. OFF. **AIR-WEIGHT CONTROLLERS**

(*Continued from page* 186)

veyors.

Some eight or ten different formulas are used for core sand, the choice depending, of course, on the properties needed in the core. Several types of sand are employed. That for blown cores is Ottawa silica sand having rounded grains that have been found best for such cores. Although some oil binders are used, resin binders are extensively employed, for cores that must have high collapsibility and produce fine finish on castings. The resin used is chiefly a urea formaldehyde type.

Two mullers for core sand are provided and they discharge batches into dump carts. These are wheeled along a balcony and are dumped through gratings into hoppers that supply coremaking machines and benches.

Castings from shakeouts generally are set on the floor or on floor skids to cool and are given a rough visual inspection. Any that are clearly rejects are scrapped at this point. Heat numbers, previously stamped on riser tops, are transferred to permanent pads on the castings themselves so as to insure positive identification of castings from given heats.

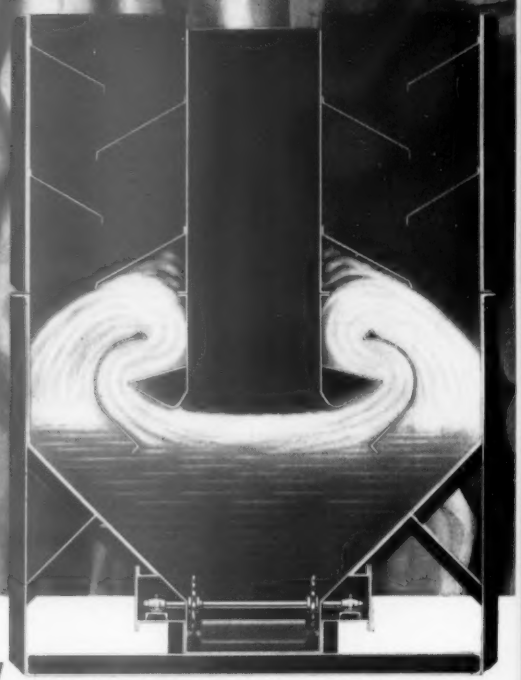
Receive Second Inspection

When castings cool, they are delivered to band saws for removal of sprues, risers and runners, these being placed in tote boxes marked to insure segregation for remelting. Then castings are placed in tote boxes for delivery to benches where snagging and such bench cleaning as may be needed is done. After inspection, all castings are put through abrasive blasting units, Fig. 13, in which steel grit cleans all surfaces.

Nearly all castings, except those in copper-base alloys and lead, are subjected to heat-treatment, chiefly in electric batch-type ovens, Fig. 16, in which temperatures as high as 960° F are attained. Some of these ovens are at floor level, but, where a quench follows heating, the oven is elevated and a quench tank below floor level is provided. Some ovens are equipped to use an SO_2 atmosphere that is used especially for magnesium alloy C which is heated to 760° F. During heat treatment, castings are placed on steel racks or in baskets, depending upon size, and are supported so as to reduce to a minimum any possibility of distortion.

All castings undergo a final inspection that, when specified, includes radiographing of the required percentage, even up to 100 per cent. There are also, of course, both visual and dimensional checking. When nec-

Modern Foundries Don't Have FUMES AND DUST



Available both as a floor-mounted type (shown) or an overhead installation. Complete with a motor-driven sludge removal conveyor, where required.

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Operators of modern foundries have long since learned the economy of ridding their shops of destructive dust and smoke fumes. Men who work in foundries free of these health hazards feel better, work better, produce more. And the accident rate is lowered. In actual foundry operation, the Schmieg CENTRI-MERGE method of dust and fume elimination has shown marked advantages over any other system. Dust and fumes are collected *immediately they occur*—shot back on a stream of air through ducts to the Collection Unit. In the washing chamber of this unit—a veritable tornado of seething, churning water-dust is washed and scrubbed from the air and flooded into the sludge tank below, permanently trapped under water. Fumes go out the exhaust. AUTOMATIC operation from start to finish.

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essary, hand straightening is done.

Although this foundry produces more than 99 per cent of its castings in sand molds, it has three machines for making centrifugal castings in metal molds. These include aluminum rings and sleeves in which rapid chilling and centrifugal action combine to give an unusually dense grain structure.

Chemical and metallurgical control form an important link in maintaining the rigid physical and chemical standards required for all castings. The entire foundry is serviced by a modern laboratory where complete chemical and spectrographic analyses are run. Physical and mechanical tests are conducted under close control and results thus secured are followed by the foundry to maintain and to improve constantly high casting quality.

Core Oil or Water?

(*Concluded from page* 75)

cent, the green permeability from 313 to 358. The relative humidity was 21 per cent and the room temperature was 72° F on the day of the test.

The second time-cycle test was performed using a nine-minute total cycle. Each ingredient was mixed for three minutes after being added, but in this case the first agent added had a total mixing cycle of nine minutes, the second six minutes, and the last three minutes. When added simultaneously, all ingredients had a nine-minute cycle. The order of additions and results of this test are shown in Table II.

This table indicates that nine minutes is an adequate mixing time regardless of the order of addition of ingredients, since all the green compressive strengths of the mixtures are the same. The highest tensile strength was shown in Test 1674 with the cereal-water-oil sequence of addition, thereby corroborating the first time-cycle test. Next highest tensile was developed when all of the ingredients were added at one time (Test 1676); while the third best method appears to be water-cereal-oil, completely verifying previous work.

With an adequate mixing time such as nine minutes, there appears to be no "poorest" method of addition, since Tests 1672, 1673 and 1675 all exhibited inferior tensile strengths compared with Test 1674.

Reasons for the different results obtainable under different mixing procedures may be attributed to the development of bond brought about through the combination of the pregelatinized cereal and the water in the mixture. When the water and cereal are allowed to be mulled together (and form a "paste") both the green and dry bond of the mixture is high. This "paste" formation is further corroborated by the increase in air dry strength as shown in Tables I and II.

Whenever the addition of cereal and water are separated during the mixing cycle or the sand grains are first wet with oil, the resulting strengths are poor. The separation of the cereal and water inhibits paste formation. Apparently, if the paste is allowed to form after the sand grains are coated with oil, the adherence of the paste to the coated sand grains is not as great as if it were "glued" to the clean grains first and then the whole mass coated with oil .

Pacific Coast Has New Steel Foundry

IN operation less than a year, the Superior Electrocast Foundry Co., 12 Geary St., South San Francisco, is the West coast's newest steel foundry. It specializes in prompt service in production of carbon and alloy steel castings, and on a number of occasions the company has picked up patterns and delivered finished castings within 24 hours.

Charles Hoehn Jr.

Heading the organization is Charles Hoehn Jr., son of the former president of the Enterprise Engine & Foundry Co., San Francisco, and manager of the latter's foundry division before forming his own company. George Brayer is vice president; Hugh Prior, metallurgist; Frank Zuest, purchasing agent, engineer and treasurer, and R. B. Johnson, plant superintendent and a member of the board of directors. Ed Rosemont, a general contractor who helped procure the land and construct the plant, also is a board director.

The plant, employing 26 operators, is equipped with modern facilities including sand mixer, barrel and shot blast room, and heat treating oven. Melting equipment consists of an electric arc furnace with a normal capacity of 3000 pounds per hour. A well equipped laboratory is employed for metallurgical work and sand testing.

Products of the new company cover a wide range including castings for ship parts, cranes and rolling mill elements, pipe fittings, valve bodies, gears, and components for various types of electrical equipment.

Business Analysis

Research Institute of America Inc., 292 Madison Ave., New York 17, has published an analysis designed to enable businessmen to study readjustments which may be necessary as wartime backlogs are filled and operations are adjusted to the current replacement market. Entitled "If Prices & Sales Dropped X%," the 36-page booklet is divided into four parts covering the following points: How To Check Your Current Position; How To Analyze Your Vulnerability; How To Project Sales, Costs, Cash, Margins; and Figuring Your Future Position.

BAY CITY DIVISION, THE DOW CHEMICAL COMPANY, BAY CITY, MICHIGAN

★ The Dow Chemical Company of Midland, Michigan is internationally famous as the pioneer in developing alloys and processes for quality magnesium "Dowmetal" castings.

In 1941 Dow built its Bay City facility for producing magnesium permanent mold and sand castings. Machining, heat treating, pickling, impregnation and shipping are located in a building 42,000 square feet in size. This building also houses complete laboratory and inspection equipment. Core room, molding bays, and melting equipment occupy a 220 x 400 foot building.

Just a few reasons why this foundry is a good place to work are a ventilation system exhausting 1,200,000 cubic feet of air per minute; automatic sand handling equipment with a capacity of 60 tons per hour; eight core blowers producing cores from a fraction of an ounce to over 200 pounds; good housekeeping and safety practices; and labor saving molding machines.

Among these, Herman Pneumatic is well represented. Dow uses several Herman 3000-pound jolt, rollover, pattern draw machines. These have proven themselves economical, durable and fast. Their reliability and adaptability to a wide range of casting sizes demonstrates once again that Hermans here, and everywhere, have made their way by the way they're made.

Herman **MOLDING MACHINES**

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH, PA.

Man-to-Man ON THE MOLDER'S BENCH

By RALPH L. LEE

"Spick and Span"

I hope I never get the reputation of being one of those self-appointed critics of the foundry industry, for Heaven only knows that I don't intend to be, nor have I any right to be since I'm just an amateur. But still and all I can't help adding two and two as I go around the country visiting one foundry after another.

When I go into a foundry I always have so much to learn with so many questions plaguing me that I am all eyes and ears. I can honestly say that I have never visited a foundry yet where I didn't learn something new or see definite proof that what I had thought was so was correct or not.

Gets Two Impressions

But regardless of what I am looking for there are always two impressions I automatically get whether I try to or not: HOUSEKEEPING and WORK-PEP. What's more, I don't believe that anyone, whether he knows anything about the foundry or not, can visit one and escape these impressions. But be this as it may, I have been forced to the conclusion, after visiting hundreds, that it is almost impossible to find a foundry that is kept spick and span without seeing the folks who work there full of pep and going to it at a fine healthy tempo. I am as sure as I am of anything that the two not only do go together but they just can't be separated.

I am always very careful as to what I say to the Boss of a foundry that is somewhat on the sloppy side, for I have found that these folks are somewhat touchy on the subject. On any number of occasions, when they have seen me looking out of the corner of my eye at a particularly messy pile of junk back in some dark corner, they usually say something like this, "Doc! you've sort o' caught us with our suspenders broke, so to speak. You see we've a lot of remodeling to do. Next Monday we are planning to start a real he-man clean-up campaign."

I usually try to cheer them up by saying, "Oh! don't think anything about it. I know how these things are—everybody's got to have a general housekeeping now and then—I know we do at home."

"But Doc," they usually continue, "what gets me is this—we'll get the whole place cleaned up fine and then, by golly, before you know it, we're right back where we started. What I want to know is, how in the devil can we get these cookies to keep the place in order? That's what I'd like to know."

Then we go into the boss's office (I have one of the many specific cases in mind). "Here wait a minute Doc, till I get that junk off the chair so you can sit down. Bill dust that seat off for Doc."

Several years ago I spoke to a large group of foundrymen on the subject of "Leadership and What It Takes." Among the personal characteristics which I had found in common with top-notch leaders was orderliness. To illustrate the point, I described the office of a foundry owner I had visited. It was a lolly. On one end of the desk were three milk bottles, all of which had had coffee in them at some time or another. From the mold growing in the bottom of one of them, it must have been there at least a month.

There were several sawed-through castings on that desk. What two pipe elbows and a coupling were doing there was beyond me. One of three good-sized cores had given up the ghost—practically a pile of sand. Sample cans of core oil. The remaining surface was covered with heaps (not piles) of paper, pamphlets and, I imagine, unanswered correspondence. There wasn't room enough to sign a check. Every other flat surface in the room, including parts of the floor, was occupied. This is the picture I painted in my talk and it wasn't exaggerated one tiny bit.

Results in Clean-up

Maybe it was a month later, I can't just remember, but a fine-looking fellow came into my office and introduced himself. "Oh, you're Mr. Boswell," I said. "Aren't you the fellow who owns the Excelsior Foundry? Gee, I've been wanting to meet you—here, give me your hat—have a chair."

"Well look, Doc, what I came to see you for is to tell you how much I enjoyed your talk down at the foundry meeting."

"Thanks," I said. "That was certainly one fine bunch."

"I had my three superintendents down to the meeting with me and do you know what those dirty, low-down devils did when you described that messy office?" I shook my head. "Those unprincipled pups stood up in the meeting, looked right at me and grinned.

"Well sir, the next morning I got down to work an hour early and I went through that office of mine like a dose of salts. Then after dusting off my hands I went into the office of the superintendents, all cocked and primed to rub it into them good. And I'm a son-of-a-gun if they hadn't beat me to it. They had done the same thing to their office.

"But Doc," he went on, "the main

(*Concluded on page* 194)

Presenting the new...

SIMPSON
T. M.
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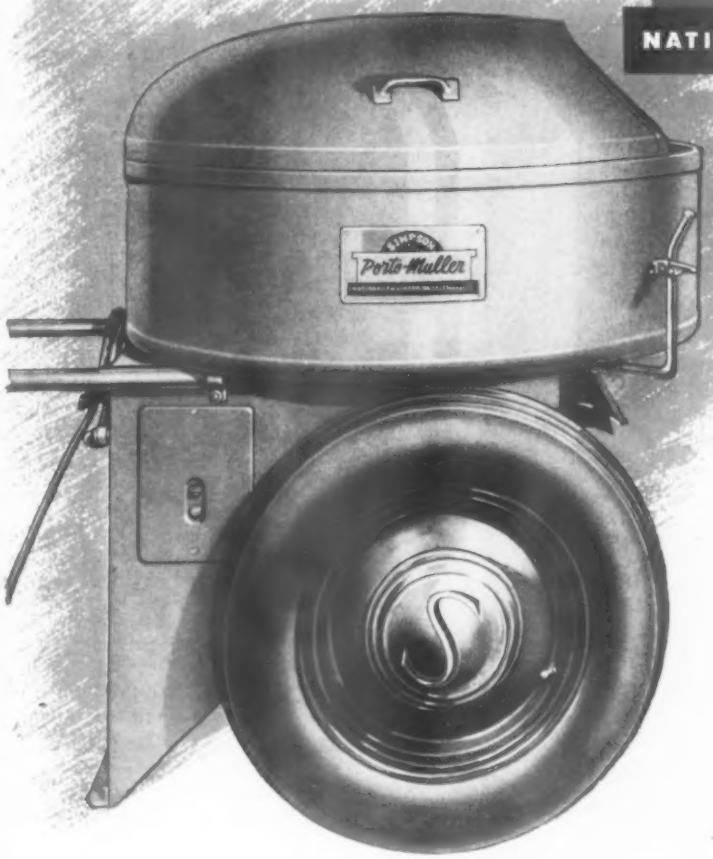
Porto-Muller

NATIONAL ENGINEERING CO. Chicago, Ill.



...a Low-Cost 100% PORTABLE MIXER for all TYPES of FOUNDRY SAND

Now you can have a rugged, low-cost, compact mixer "package" that is completely self-contained and 100% portable. *No auxiliary hoists or ceiling supports are required!* This new Simpson "Porto-Muller" is easily rolled over rough, uneven floors on its big, pneumatic implement type tires . . . right up to the sand pile for quick loading and mulling.

Look at the outstanding "Porto-Muller" features listed at the right and then have a National Engineer show you how this versatile muller can increase both the quantity and the quality of your castings at lower cost.

Outstanding features...

- **LOWEST COST MIXER** of its size and type available today.
- **100% PORTABLE**—no hoists or ceiling supports required.
- **EASY TO HANDLE** — rolls on standard 6.00 x 16 implement type tires. Ready to go the minute it arrives.
- **BIG CAPACITY**—easily handles 250 to 300 lbs. of sand.
- **STANDARD MOTOR**—3 H.P., 1800 R.P.M. motor, interchangeable with any NEMA Frame Motor.
- **ADJUSTABLE MULLERS**—Spring adjustment pre-loads mullers to correct weight for all types of sand.
- **PROVED IN USE**—"Porto-Mullers" have been tested and proved right on the floors of leading foundries.

FOR FULL DETAILS, WRITE FOR NEW BULLETIN 492

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Intensive
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NATIONAL *Engineering Company*

608 Machinery Hall Bldg. • Chicago 6, Illinois

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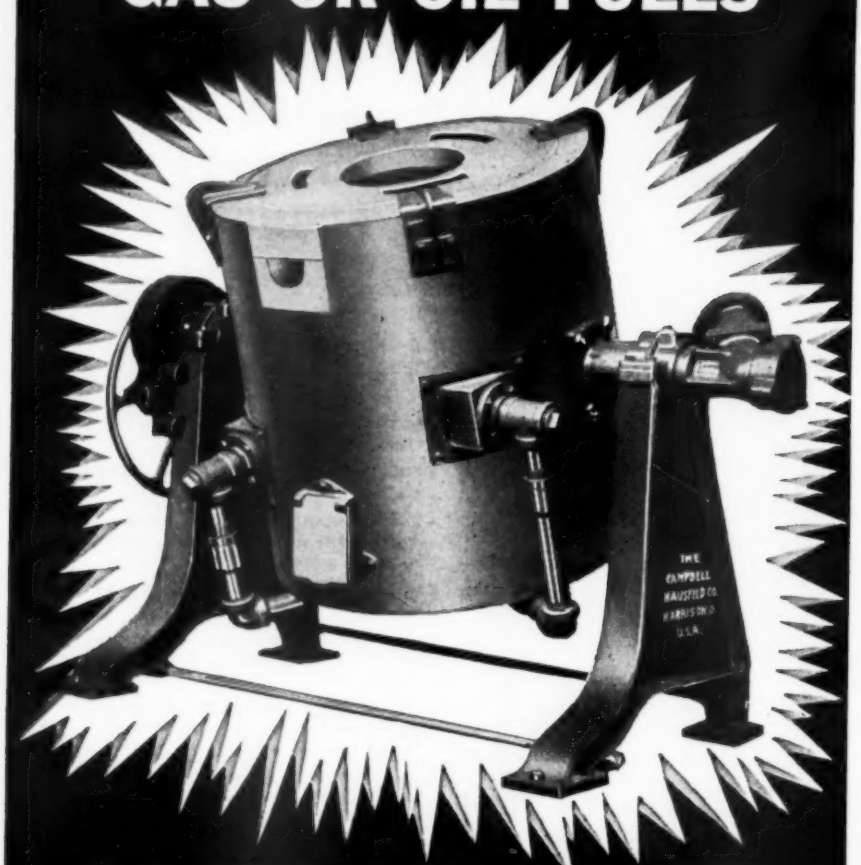
METAL MELTING **FURNACES**

FOR

BRASS—ALUMINUM—MAGNESIUM

AND ALL OTHER NON-FERROUS METALS AND ALLOYS

GAS OR OIL FUELS



TILTING AND NON-TILTING TYPES

SINGLE AND MULTIPLE BURNERS

AUTOMATIC PROPORTIONING SINGLE VALVE CONTROL ASSURES UNIFORM RESULTS WITH MAXIMUM ECONOMY OF OPERATION.

The Campbell-Hausfeld Co.

300-320 MOORE ST. HARRISON, OHIO

(*Concluded from page* 192)

reason for coming down to see yo is to report that that clean-up ex ample we set is spreading all ove the plant, and believe it or not, i this short time, our production is coming up and our scrap is going down; both kinds."

I know that Mr. Boswell hadn't learned anything new from me and that we are now talking about something pretty elementary; but just the same, elementary or not, I'm sure we all know for a fact that ORDERLINESS is the foundation of a successful business. Moreover, ORDERLINESS has got to be a style—a way of life, a way of thinking and a way of working. It can't be sprayed on an organization or campaigned into an organization; it's got to grow into an organization from example, and that example has got to be set right up in the front office.

I forget who said it years ago, but an organization is truly the lengthened shadow of someone. I have noticed that the example of orderliness leaks out of the buildings to the street in front, even between the buildings on the property, to the coke pile, the pig iron and scrap pile. But again I say I do not want to get the reputation of being one of these cantankerous critics.

Gray Iron Founders Meet Oct. 27-28

Gray Iron Founders' Society, Cleveland, will hold its 21st annual meeting at the Edgewater Beach Hotel, Chicago, Oct. 27-28.

Principal speaker at the two-day meeting will be Everett M. Dirksen, former congressman from Illinois, who will speak on "Must We Control Bigness in Government."

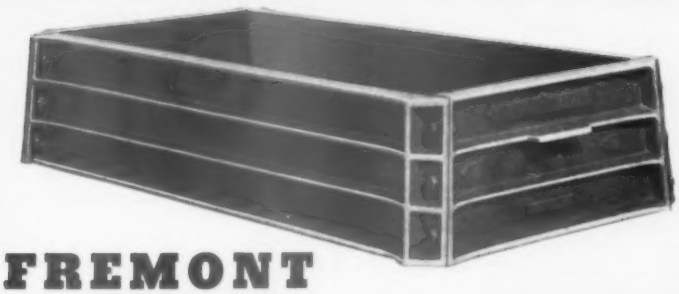
Also featured on the first day's session will be a symposium on "Nodular Graphite Gray Irons" by a group of nationally known metallurgists. Both the technical and commercial phases of the subject will be covered by the speakers.

On the second day Frank R. Elliott, Westinghouse Electric Corp., Springfield, Mass.; Lee Shaw, Seyfarth, Shaw & Fairweather, Chicago; Edward Marker, Fuller & Smith & Ross, Cleveland, and James I. Banash, safety consultant, Chicago, will discuss important phases of specific management problems relating to plant mechanization, labor relations, sales techniques and industrial safety.

The general convention committee is headed by T. L. Arzt, T. L. Arzt

(*Concluded on page* 196)

Wells Mfg. Co.'s new foundry in Skokie, Ill. Its 28,800 sq. ft. of floor is well covered by Fremont cast iron jackets and magnesium flasks. They're standard equipment.



FREMONT
CAST IRON JACKETS

FREMONT
MAGNESIUM FLASKS

BUILT FOR LONG SERVICE & FAST PRODUCTION

ALL ORDERS GIVEN VERY PROMPT ATTENTION

GROOVLOCK
THE FOOL-PROOF PIN

THE FREMONT FLASK CO.
Fremont, Ohio

TURN DUST INTO PROFITS*

Hundreds of plants have done it... with Pangborn Dust Control!

*** PROFIT $13,951**

Pangborn Dust Control eliminates dust, pays for its operation, and *earns $13,951 each year* on charcoal salvage for this manufacturer!†

*** PROFIT $12,752**

In a large grain mill, Pangborn Dust Control eliminates dust hazards and *earns a profit of $12,752* annually, salvaging grain formerly lost as dust!†

*** PROFIT $7,691**

Based on operating costs before and after Pangborn Dust Control was installed, savings, other than salvage, for this metal plant *run $7,691 a year!*†

*** PROFIT $5,103**

Asbestos salvaged to the tune of *$5,103 yearly* . . . dust completely eliminated . . . that's the Pangborn Dust Control profit story for this Asbestos manufacturer!†

HOW ABOUT YOUR PLANT?

Let us make a "Dust Pocket" survey in *your plant*. There's no obligation! Pangborn engineers show you how the right Pangborn Dust Control equipment saves you money . . . boosts your profits! For full information and your *free copy* of Bulletin 909A on the control of industrial dust, write today to: PANGBORN CORPORATION, 300 Pangborn Blvd., Hagerstown, Maryland.

Look to Pangborn for the latest developments in Dust Control and Blast Cleaning equipment.

THE DUST HOG from stealing profits with

Pangborn

DUST CONTROL

(*Concluded from page* 194)

Foundry Co. Other members of the committee are: C. T. Milles, C. H. Milles Foundry Co., Chicago; C. B. Magrath, Greenlee Foundry Co., Chicago; H. S. Faust, Hansell-Elcock Co., Chicago; E. B. Sherwin, Chicago Hardware Foundry Co., North Chicago; D. A. Cullinan, Western Foundry Co., Chicago; F. B. Skeates, Link-Belt Co., Chicago.

British Management Bulletin

Conclusions of a study group of British senior executives of Birmingham (England) industries has been published by the Industrial Administration Group of the Students Union, Birmingham Central Technical College. Entitled "A Code of Management Practice Relating to the Status of the Foreman," the booklet offers suggestions on selection and training of the foreman, development of specialist services to aid production, and personal relationship of the foreman to trade unions and other external bodies. Informing and consulting procedures are outlined and remuneration is discussed.

The group which made the study was composed of executives in control of factories in widely differing branches of industry. Copies of the booklet are obtainable by addressing the Secretary, Industrial Administration Group, Birmingham Central Technical College, Birmingham, England. Price including postage, 50 cents.

Standard Samples

National Bureau of Standards, Washington, has issued an up-to-date list of standard samples, a 19-page booklet containing schedule of fees, unit weights, directions for ordering, and other information. The bureau now issues more than 400 different kinds of standard samples, comprising materials of certified composition. Representative uses of the bureau's standard samples include checking of chemical and instrumental methods of analysis; calibration of spectrometers, spectographs, pH meters, calorimeters, pyrometers; establishment of uniformity in test methods, etc. List can be obtained free upon request from the Publications Section, National Bureau of Standards, Washington 25, by referring to supplement to National Bureau of Standards Circular 398, "Standard Samples Issued or in Preparation by the National Bureau of Standards."

PRINCESS WENATCHEE:
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60-pound Keokuk Electro-Silvery Pigs for blocking the open hearth heat. For equal distribution of silicon and best temperature melt-down. Handled by magnet.

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30-pound Keokuk Electro-Silvery Pigs for charging mechanically or by hand into the cupola. Easily broken into two or more pieces, handled by magnet and measured by weight. Regular or alloy analysis.

FOR FOUNDRIES

12½-pound Keokuk Electro-Silvery Piglets so uniform in weight that they may be charged into the cupola by count, eliminating weighing operations. Handled by magnet. Regular or alloy analysis.

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By PAT DWYER

Drawings by RICHEY

ADVENTURES OF Bill

BILL and I stood at a high office window idly watching a huge ore boat back away from the coal dock where she had taken on a supply of bunker coal. She backed out slowly, swung gracefully on her heel and then gathering speed, headed out through the opening in the breakwater leading to the open lake.

"The *Harry Coulby,*" Bill volunteered. "One of the biggest vessels on the lakes."

"How do you know?" I naturally inquired. "You may have the eyes of Pawnee Bill, the White Chief of the Pawnee Indians, but even if the name, in letters a foot high, was on the bow and stern—which they are not—I am quite certain neither you nor Pawnee could read the name at this distance."

"I may not be as clever and sharp eyed as the three tailors filled to the neck with spirituous and malt liquors, and to the top of the head with resulting delusions of grandeur—"

"Friends or relatives of your's?"

"I am referring to the three tailors first mentioned in Joe Miller's original joke book and incorporated in every collection of jokes, real and alleged, since Joe joined the vast host on the way to the bourn from which, as the fella says, no traveler ever returns. I have read the little Annie Dote many times in all kinds of publications. The radio boys will discover it one of these days and spring it as an original contribution.

"The three knights of the scissors, thimble, needle and thread met one day in one of these havens of refuge thoughtfully provided in practically every community in this broad land for the refreshment of weary and thirsty pilgrims. After about the third or fourth round, (See *Bar Tender's Guide,* Page 760) one character volunteered the information that without exception, he was the best and most skilful tailor in this or any other country. In proof of this modest statement he claimed he did not need to measure a man for a suit. 'Just give me one good look at a man,' he said, 'and I can pick out the cloth and make him a suit that fits as smooth and slick as the paper on the wall.'

"The second bimbo ventured the opinion that was only apprentice talk. 'Where I learned the trade,' he declared, 'a man was not considered a competent journeyman until he could make a suit for a man whose coat tails were glimpsed going around a corner.'

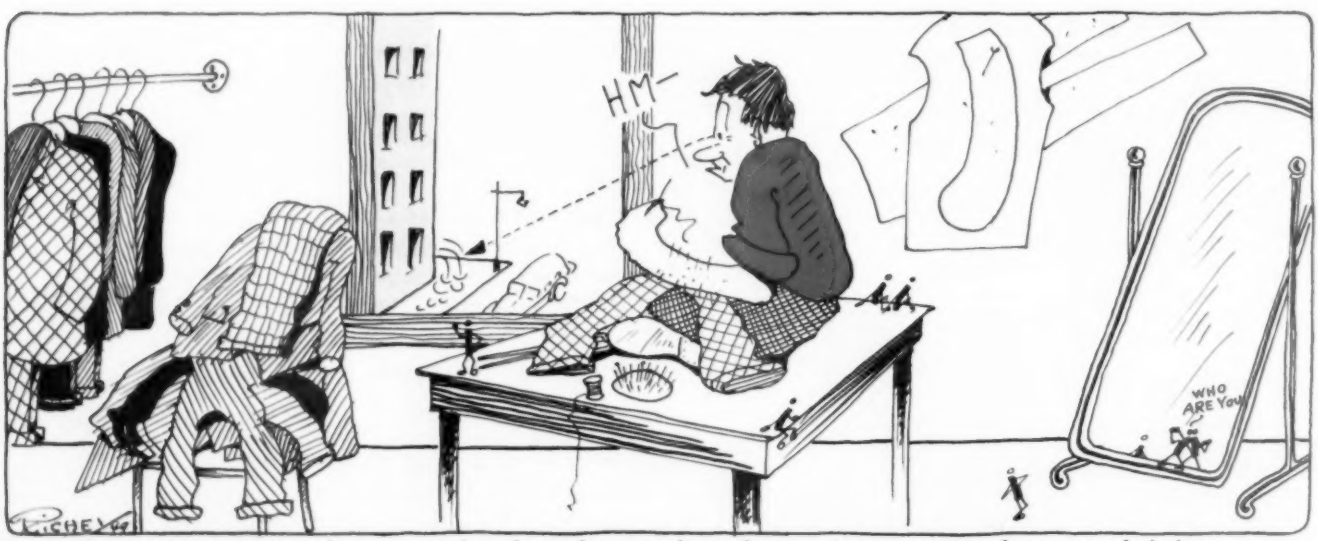
"The third member of the grou slowly applied the index finger an thumb of the right hand to squeez the last drops from a noble mous tache. Hic-cupping slightly, he file a vigorous objection. 'All amateu stuff,' he pointed out. 'Down in ou part of the country a man is not accepted into the Brotherhood until he can make a suit for a man after a casual glance at the corner the man went around.'

"I may not be as clever or as sharp eyed as these cross-legged weasels, but I am fairly familiar with all the vessels that come into and go out of this port regularly. The *Coulby,* the largest boat on the lakes for several years or until five super-doopers were built during the war years, was named after a man who came from England as a boy, friendless and penniless. He had health and strength and a driving ambition that eventually seated him in the general manager's chair of the company which owned and operated one of the largest fleets on the Great Lakes. Yes, sir! Harry Coulby was a great man."

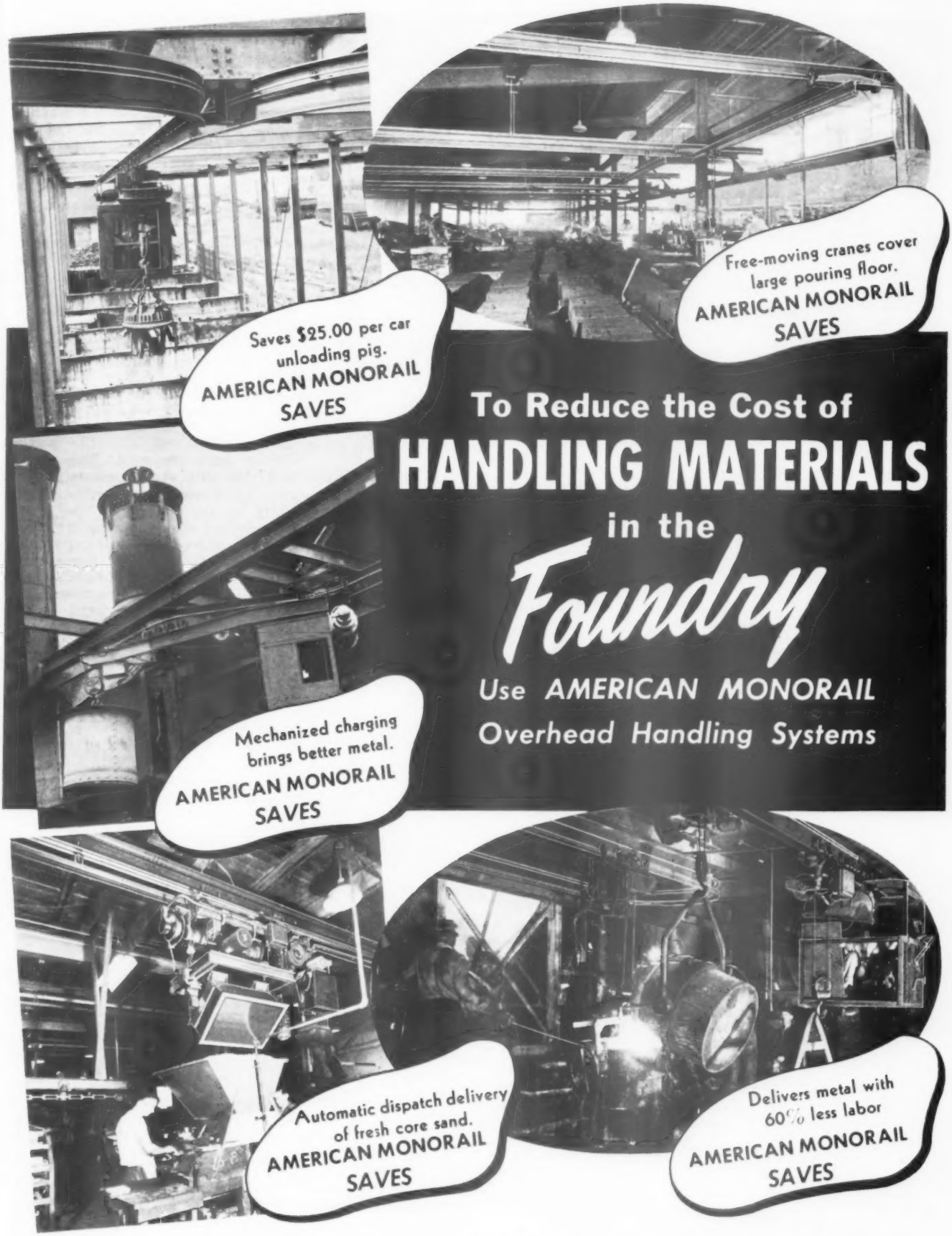
"Did you ever work for him?"

"No, but I know several men who did. Their opinion coincides with mine. I have the greatest respect and admiration for any man who starts with nothing and who finally arrives at the top of any industrial organization. Perhaps I should qualify these noble sentiments to the extent they apply only to men who retain the respect and admiration, and in some instances the affection, of employees who were associated with them during their various stages of progress. My admiration list also includes people—usually young men—who courageously break away from

(*Continued on page* 200)



Expert demonstrating the approved and simple procedure of measuring a customer for a suit of clothes



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BAROID
SALES DIVISION
NATIONAL LEAD COMPANY

BENTONITE SALES OFFICE:
RAILWAY EXCHANGE BLDG.
CHICAGO 4 • ILLINOIS

(*Continued from page* 198)

a steady pay roll and start their own business on very limited capital.

"I had a letter a few days ago from one of these men. With a congenial partner he had established a machine shop and jobbing foundry. As experienced machinists the partners had no trouble within the machine shop. In the foundry the situation was not quite as smooth. Here, I'll read you the letter:

Some time ago we cast three crane counterweights, about 1500 lb each. They were to have 1¼-in. bolt holes through a 6-in. section. The holes terminated in a 2-in. square by ½-in. deep countersink section. The castings were poured in open molds and we had trouble with removal of the cores. We tried three methods with the same result. In the first trial we used plain sand cores held down by light angles across the mold. The cores burned off and the angles warped with the heat. The second trial was with sand cores reinforced with heavy rods and stuck tight in prints in the bottom of the mold. This method also was a failure. Then we tried pipes, correct ID and filled with core sand. These burned off. After drilling holes through a mixture of iron and core fragments, the machine shop foreman declined my kind offer to cast him a bending plate, similar to those in boiler, fabricating shops and ship yards. He claimed he was fresh out of square drills of the correct size. How should we have done that job? We are exactly where we were before, richer only by the knowledge of how *not* to do it.

Our next problem has to do with present and future plans in which we vitally are interested. At present we are estimating on a keyboard casting for a local piano factory. This is a very open and slender frame to support the key mechanism. Formerly this was a heavy plank. The piano makers have decided to use a casting instead of a plank. We made a few satisfactory sample castings, but now we are faced with a new problem. The firm will not change to castings unless they can get them for the same price as the planks. The casting has 30 pads to be machined, and 18 holes to be drilled. We can handle the machine work (that really is our line) but can we make these castings fast enough in the foundry to keep alive?

The casting would take a flask 15 x 60-in. with 5-in. cope and 4-in. drag. We are still undecided on several items in the program. We are thinking of pop-off flasks and metal bottom boards. One factor in our indecision is that eventually we hope to use the same equipment for making piano plates. We are confident we can do the job as well as a few foundries that now monopolize the business. In the machine shop we can cut some corners.

(*Continued on page* 202)

FIVE PIECES

OPERATIONS

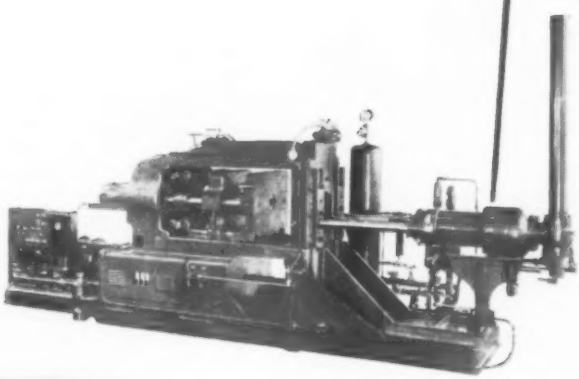
STAMPING
DRAWING
WELDING
MACHINING
FINISHING

ONE PIECE

OPERATION

DIE CASTING

DIE CASTING MACHINES



ONE of the most prominent radio manufacturers in the midwest recently made a survey of the parts going into its equipment from the point of view of reducing costs. One unit comprised of 5 parts involved stamping, piercing, drawing, bending, machining and partial plating and **then required 32 or more spot welds for assembly!** It was a matter of simple economy which convinced company engineers to turn to Lester-Phoenix Die Casting Machines which produced the unit in ONE PART! The elimination of all the above-mentioned operations reduced the cost appreciably. You owe it to yourself to check on how Lester-Phoenix equipment can effect major savings in your plant!

Write for your free copy of the Lester Press

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Here's how to simplify the laying out of patterns, core boxes and similar jobs and check your work. You can have horizontal, vertical and inclined positions in a jiffy and *hold them rigidly*. The graduated rotary table can be locked in any radial position desired. The SPO Layout Table, developed in our own organization, fills an invaluable place in scores of other plants.

Always find out first what SPO has to offer.

MEMBER

SPO INCORPORATED

Specialists in Molding Machines, Vibrators and Patterns for Production

7500 GRAND DIVISION AVENUE • • CLEVELAND 5, OHIO

(*Continued from page* 200)

The key bed casting will weig about 28 lb and will be poured two-up inside two of the openings. W were considering a certain type o molding machine and with an air operated rollover rig alongside. In a recent issue of THE FOUNDRY we saw the advertisement of a machine that seems specially adapted to work of the kind we have in mind. We have written for further particulars, especially if the machine will handle flasks 60-in. in length.

The castings will not fit into our home-made tumbling barrel. We can either make a king size barrel or buy a swing table. Do you think a tumbling barrel will clean the castings without breakage? Will the mill cause the castings to warp? Molding

First liar has no chance

production will have to be a minimum of 10 per hour.

What is the best way to make piano plates? One foundry uses simple floor molding with a gang of big, husky, hairy molders. A second foundry uses a sandslinger and each foundry manager is heavily prejudiced in favor of his equipment and methods. We have had like conflicting opinions from several other foundrymen. We are inclined to the opinion that we can make piano plates in well fitting and rigid flasks on a large jolt machine. The piano people hesitate to give us the business. They claim we have not enough floor space. We feel that the flasks could be stacked with enough offset to enable us to reach the sprues.

We shall appreciate your opinion on another more or less hare-brained idea. At present we have no mechanical sand system. After every heat the sand is cut over with a sand-cutter. We feel that we could make a mobile unit on a pair of rails to carry our large molding machine.

(*Continued on page* 204)

Smith L-O Core Oil

CORE WASH ROD DIP LIQUID PARTING

SMITH L-O CORE OIL

An Integral Part of Your Core Making

Giving your core makers expertly finished patterns and top-notch equipment is not enough. Core oil of *absolute uniformity* must be integrated into their work if quality castings are to be the ultimate result.

And, for *absolute uniformity,* Smith L-O Core Oil has no peer. This is because it is the only core oil processed by the Dow-Therm method of heat treatment . . . an indirect fire processing that permits absolute uniformity through precise control.

You'll find Smith L-O returns appreciable dividends in the nature of savings in time and effort . . . in accurate core making and true castings. Order this binder of superior quality and know first-hand the results that speak for themselves.

Smith L-O Core Oil

WAREHOUSE STOCKS AVAILABLE
In The Following Cities

- COLUMBIAN WAREHOUSE CO. — Reading, Pennsylvania
- FOUNDRY SERVICE CO. — Birmingham, Alabama
- E. R. FROST CO. — Minneapolis, Minnesota
- MARKET TERMINAL WAREHOUSE — Buffalo 4, New York
- MALCOLM G. STEVENS — Arlington, Massachusetts
- TERMINAL WAREHOUSE — Worcester 8, Massachusetts
- TOMKINS TIDEWATER TERMINAL — South Kearny, New Jersey
- M. W. WARREN COKE CO. — St. Louis, Missouri
- WESTERN FOUNDRY SAND CO. — Seattle, Washington
- WESTERN INDUSTRIAL SUPPLY CO. — Portland 14, Oregon

SMITH OIL & REFINING CO.
MANUFACTURERS OF L-O AND CERTIFIED CORE OILS
INDUSTRIAL OILS DIVISION . . . ROCKFORD, ILLINOIS

COULD ANYTHING BE MORE CONVINCING THAN YOUR OWN EXPERIENCE?
Then give HERC-ALLOY the toughest chain job in your plant. Our asking for this test reflects the confidence given us by HERC-ALLOY service records from industry's leading plants.
HERC-ALLOY
STEEL CHAIN

HERC-ALLOY is America's ***first alloy*** steel chain. For slings or other applications HERC-ALLOY Chain will prove that efficiency, safety and economy can go hand-in-hand.

COLUMBUS McKINNON
CHAIN CORPORATION
(Affiliated with Chisholm-Moore Hoist Corporation)

GENERAL OFFICES AND FACTORIES: TONAWANDA, N. Y.

SALES OFFICES: NEW YORK • CHICAGO • CLEVELAND • SAN FRANCISCO

Other Factories at Angola, New York, St. Catharines, Ontario and Johannesburg, S. A.

(Continued from page 202)

the rollover device, a section of conveyor and a small jib crane to handle the finished molds and set them out on the floor. After the molds are poured and shaken out we would reverse the machine on the rails, place the sandcutter on a platform under the sand bin. The machine would return the length of the floor, cutting over the sand and putting it through the mixer.

In the past we have built a great deal of special machinery. So far as the actual construction goes, we However, we are a little dubious feel we are technically competent. about the whole idea. If it is as good as it looks to us, why hasn't some one taken it up and used it?

"A full and complete answer to all these questions would involve the writing of a book and was altogether out of the question within ordinary correspondence limits. I turned the request over in my mind several times and then wrote him as follows:

1—The use of extra heavy steel pipe to form holes in castings is fairly common foundry practice. In many instances the pipe is not packed with sand or any other material. The molten metal in immediate contact with the pipe becomes slightly chilled and forms a protective sheath. However, in thick, heavy castings it is advisable to pack the pipes with a mixture of 90 per cent silica sand and 10 per cent sawdust, and just enough binder to hold the packing together. Before use the pipe cores are baked in the oven like any other cores. After casting, the sawdust burns and helps to disintegrate the sand.

A possibility exists that you poured the metal at a much higher temperature than necessary. Also the stream from the gate should not be allowed to impinge on the pipe. The main reason for packing the pipe is to prevent the pipe from collapsing under the combination of heat and pressure. A generous size vent hole is provided in each core.

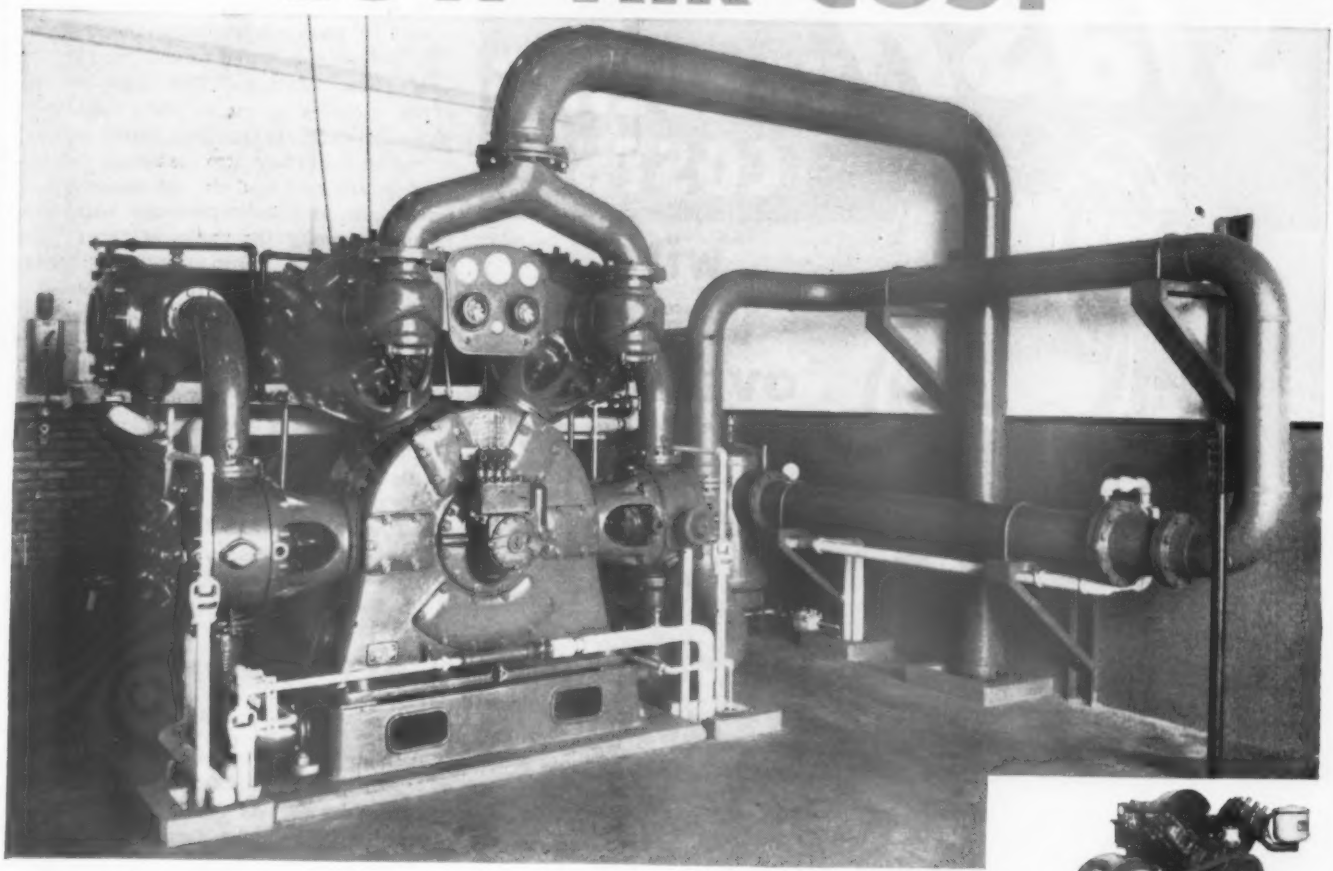
2—Cores for bending slabs are made from a mixture of 80 per cent silica sand, 10 per cent silica flour and 10 per cent sawdust. The cores are generously vented through the center and bonded with any binder, preferably rosin. In addition the cores are heavily coated with plumbago, or preferably silica wash.

3—I see nothing wrong with your plan to make the key bed casting. The makers of the machine can advise you on this problem.

4—The casting can be cleaned in a tumbling barrel, carefully packed with pieces of wood between the layers. You might do better with a re-

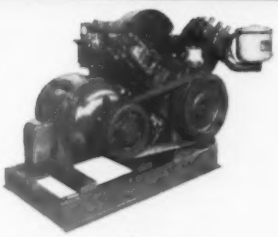
(Concluded on page 206)

High Air Capacity . . . Unmatched in LOW AIR COST

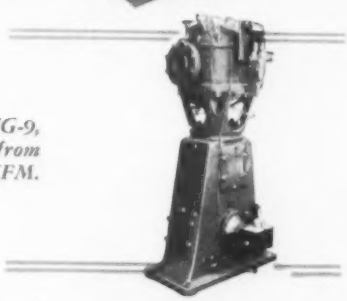


JOY WN-114 COMPRESSOR

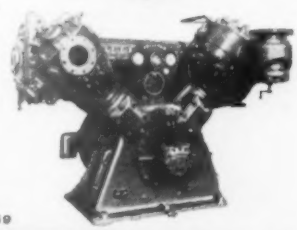
The JOY WN-114 is a four-cylinder, two-stage, double-acting compressor producing 1092 to 3656 CFM in single units, and up to 7312 CFM in twin units, depending on pressure. Exclusive "Dual-Cushion" valves provide top efficiency in low-cost air power. ● JOY builds the most modern compressors available for either centralized or decentralized air supply—*write for Bulletins.*



The JOY WL-80, in 9 sizes from 81 to 590 CFM.



The JOY WG-9, in 11 sizes from 153 to 822 CFM.



The JOY WN-112, in sizes from 378 to 1828 CFM.

Consult a Joy Engineer

W&D 12059

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

slash HANDLING COSTS with WEBB OVERHEAD CONVEYORS

OUNCE TO TON LOADS

If you handle small parts and products of a few ounces weight . . . or big assemblies weighing tons — there is a Webb overhead conveyor which will cut your handling costs.

We build overhead conveyors in 2", 3", 4" and 6" sizes. The two inch "Junior" is a champion in knocking out high handling costs in small parts and assemblies. The 3" and 4" are of progressively greater capacity—and the 6", equipped with a double load bar, will carry nearly 5,000 pounds per single hook load.

In thirty years that we have been building conveyors into industry, Jervis B. Webb engineering skill and experience has gained a wide reputation for quality unexcelled—for important savings in manufacturing and assembly costs.

Let us show you what can be done in dollars saved in your own plant.

Write for our Overhead Conveyor Catalog

JERVIS B. WEBB COMPANY

8951 ALPINE AVE.
DETROIT 4, MICH.

OFFICES IN
PRINCIPAL CITIES

CONVEYOR ENGINEERS AND MANUFACTURERS

(*Concluded from page* 204)

volving sand blast table.

5—Since the demand is limited piano plates are made only in a small number of foundries. In a short time the molders become unusually skilful. However, it is a form of skill difficult to pass along unless the learner actually is engaged in the production of these castings. For that reason the molders in piano plate foundries usually are regarded as fairly steady workmen. They are satisfied where they are and and do not become the random and indiscriminate ramblers found among the ranks of those who are wont to claim they can make anything ever attempted "under the big hook." Extremists occasionally claim they can handle any thing which has at least one loose end.

6—Your idea of preparing the sand, etc., I think is quite feasible. The fact that others have not adopted the plan does not put it in the dog house. From the time the world began, or at least from the days of Jubal and Tubal Cain, the pioneer has had to make his own paths.

New England Group Plans Conference

New England Foundrymen's Association has announced a tentative program for its ninth New England Regional Foundry Conference, to be held at the Massachusetts Institute of Technology, Cambridge, Mass., Friday and Saturday, Oct. 7-8. Technical sessions for the two days have been arranged to provide subjects of interest to management and technical men on Friday, with papers and discussions relating to foundry fundamentals scheduled for Saturday.

Tentative program for the conference follows:

Friday, Oct. 7

9 a.m.—Registration, lobby, Building 10

9:30 a.m.—Opening of the Conference. Chairman: Arthur F. Dockry, H & B American Machine Co., Pawtucket, R. I. Address of welcome, by Thomas K. Sherwood, dean of engineering, Massachusetts Institute of Technology.

9:45 a.m.—Technical session. Chairman: Donald F. Sawtelle, Malleable Iron Fittings Co., Branford, Conn. "Gates and Risers," by Fred G. Sefing, International Nickel Co., New York.

12:15 p.m.—Luncheon, Walker Memorial, Massachusetts Institute of Technology.

2 p.m.—Lumen S. Brown Lecture. Chairman, Charles F. Miller, Fairmount Foundry Co., Woonsocket, R. I. "Public Relations and the Foundry Industry," by Frank G. Steinebach, editor, THE FOUNDRY, Cleveland.

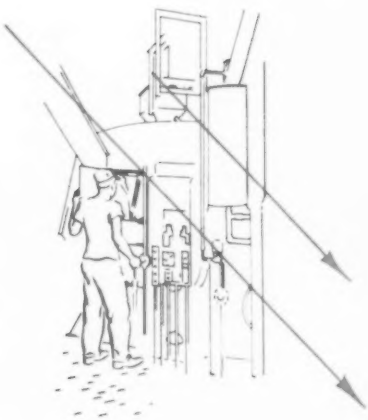
3 p.m.—Technical session. Chairman: James Southworth, Grinnell Corp., Cranston, R. I. "Core and Core Sand Additives," by Joseph A. Gitzen, president, Delta Oil Products Co., Milwaukee.

6 p.m.—Conference dinner, Graduate House, Massachusetts Institute of Technology, Arthur F. Dockry presiding. Toastmaster, Howard F. Taylor, MIT. Speakers: Dr.

(*Continued on page* 208)

PERFECT SAND PREPARATION CAN BE AUTOMATIC

with a *Clearfield Mixer*



Any Clearfield Mixer can be made completely or partially automatic by the addition of suitable time control apparatus. Thus you can substitute a predetermined, uniform procedure for the individual judgment of the operator, controlling minutely the length of tempering, the quantity of bond and all other factors. The result is consistent uniformity in the characteristics of your sand, one of Clearfield's many outstanding services.

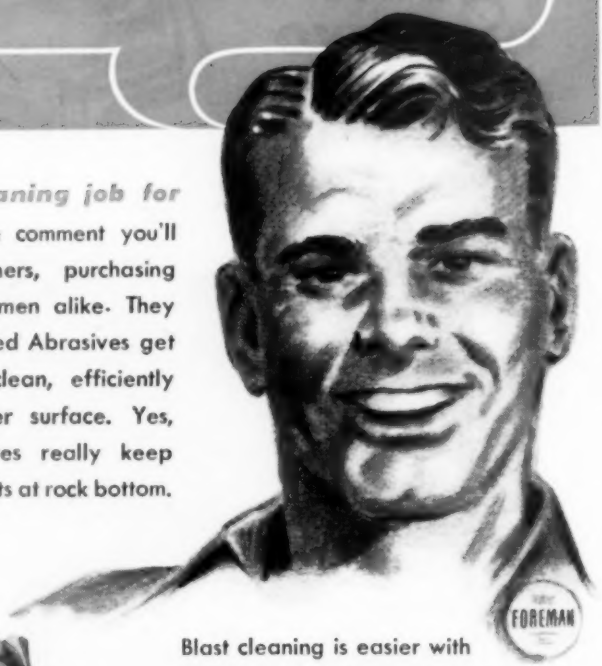
For any sand preparation need there's a Clearfield Mixer. Write today for Catalog No. 79 for complete details.

CLEARFIELD
MACHINE COMPANY
CLEARFIELD
PENNSYLVANIA, U.S.A.

One of nine No. 920 Clearfield Mixers, all equipped with automatic controls, located in a large Eastern industrial plant.

"CERTIFIED"

does a better cleaning job for us



A better cleaning job for us... that's the comment you'll hear from owners, purchasing agents and foremen alike. They all agree, Certified Abrasives get castings really clean, efficiently produce a better surface. Yes, Certified Abrasives really keep blast cleaning costs at rock bottom.

Blast cleaning is easier with Certified. Both Samson Shot and Angular Grit can be used over and over again. With them on your job you get *more work done ...every day.* Order Certified today for better cleaning!

Always specify "Certified"

ACCEPTED AND USED FOR OVER 55 YEARS.

PITTSBURGH CRUSHED STEEL CO.
PITTSBURGH, PA

STEEL SHOT AND GRIT CO.
BOSTON, MASS.

(*Continued from page* 206)

John Wulff, head of Division of Metallurgy, MIT; and Wallace G. Strathern, director of training, Eastern Gas & Fuel Association, Boston, and president, National Society of Sales Training Executives. "Standing Still or Going Ahead."

Saturday, Oct. 8

8:30 a.m.—Registration, main lobby.

9 a.m.—Technical session. Chairman, Gordon L. Paul, Brown & Sharpe Mfg. Co., Providence, R. I. "Sand—Maine to California," by Clyde A. Sanders, vice president, American Colloid Co., Chicago.

10:30 a.m.—Humanic session. Chairman, Howard Nye, Crompton & Knowles Loom Works, Worcester, Mass. "Foremen—Leaders or Drivers," by Sherman Rogers, Sherman Rogers Publications, Chicago.

12 noon—Luncheon, Walker Memorial, MIT.

1:30 p.m.—Technical session. Chairman, William N. Ohlson, Draper Corp., Hopedale, Mass. "Cupola Practice," by B. P. Mulcahy, Fuel Research Laboratory Inc., Indianapolis.

1:30 p.m.—Technical session (Nonferrous). Chairman, Prof. Howard F. Taylor, MIT. Co-Chairmen: Donald F. Sawtelle, Malleable Iron Fittings Co., Branford, Conn.; Richard Tibbetts, Wollaston Brass & Aluminum Foundry, Quincy, Mass.; E. Portman, Stillman White Foundry Co., Providence, R. I. Round-table discussion, "Making Pressure Bronze Castings," by James O'Keefe, MIT.

3 p.m.—Technical session. Chairman, Dr. Walter Saunders, Providence, R. I. "Latest Developments in Nodular Iron," by Charles O. Burgess, technical director, Gray Iron Founders' Society, Cleveland.

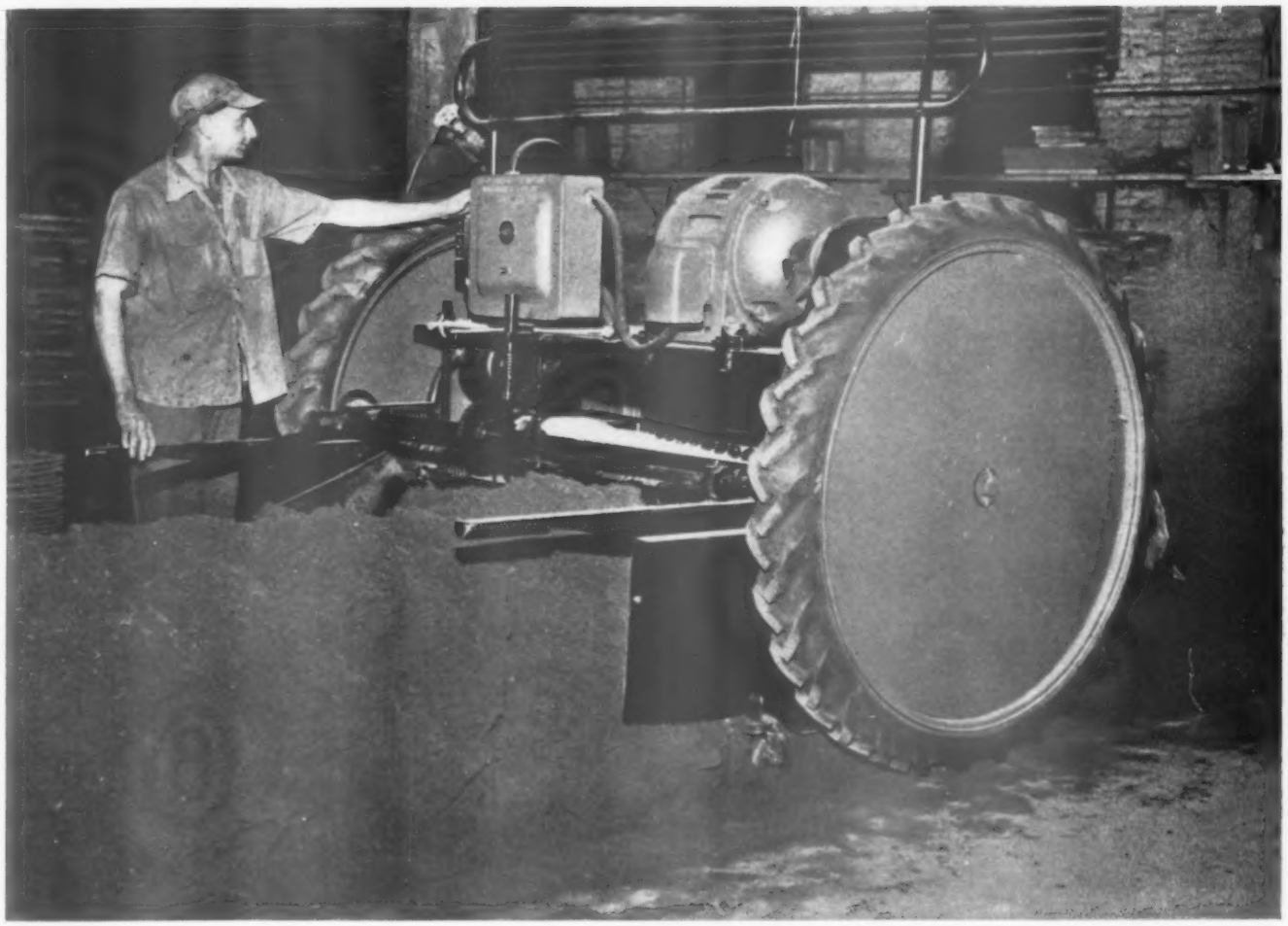
Equipment and supplies representatives in the association again will be hosts to those attending the conference at a banquet with entertainment, to be held at the Parker House, Boston, on Saturday evening. Committee handling arrangements for the banquet is composed of Ray Hunter, Hunter Sales Co., Boston, and Harry W. Impey, eastern representative of Tabor Mfg. Co., in Boston.

Committee on arrangements for the conference includes the following: Chairman, Arthur F. Dockry, H & B American Machine Co., Pawtucket, R. I.; vice chairman, Frederick M. Fitzgerald, Draper Corp., Hopedale, Mass.; program chairman, Henry G. Stenberg, Draper Corp., Hopedale, Mass.; and publicity chairman, Dr. Walter Saunders, Providence, R. I.

Other committee members are: Charles Armstrong, Warren Pipe Co. of Massachusetts, Everett, Mass.; Thomas I. Curtain, Waltham Foundry Co., Waltham, Mass.; John R. Crotty, Crompton & Knowles Loom Works, Worcester, Mass.; Thomas Healey, Seaboard Foundry, Johnston, R. I.; Frank R. Elliot, Westinghouse Electric Corp., Springfield, Mass.; Raymond F. Meader, Whitin Machine Works, Whitinsville, Mass.; Gordon L. Paul, Brown & Sharpe Mfg. Co., Providence, R. I.; Ernest F. Stockwell, Barbour-Stockwell Co., Cambridge, Mass.; Joseph B. Stazinski, General Electric Co., Lynn, Mass.; Donald F. Sawtelle, Malleable Iron Fittings Co., Branford, Conn.; Edgar B. Spencer Jr., Philbrick-Booth &

(*Concluded on page* 210)

The New Moulders' Friend
FINDS FRIENDS EVERYWHERE



Moulders like The New Moulders' Friend, because the blending action of the rotary wire brush thoroughly mixes and aerates the sand, making it easy for them to put up more and better molds.

Night crews like it, because it eliminates much manual labor and does a better job of conditioning the sand.

Sand control men like it, because it does such a thorough job of mixing that they really can control the sand.

Maintenance men like it, because it has few moving parts to keep in order.
Men who buy castings like it, because it gives them better castings with a smoother finish.

You will like The New Moulders' Friend, because it will decrease your scrap and labor costs and will improve the morale of the man in your foundry.

Begin a profitable friendship with The New Moulders' Friend by writing for further particulars.

"The Moulders' Friend"
Sand Conditioning Equipment
Dallas City, Illinois

(*Concluded from page* 208)

Spencer Inc., Hartford, Conn.; Prof. Howard F. Taylor, MIT, Cambridge, Mass.; Louis G. Tarantino, Niagara Falls Smelting & Refining Co., New Haven, Conn.; A. Tims, Saco-Lowell Shops, Biddeford, Me.; Alexander S. Wright, Standard Foundry Co., Worcester, Mass.; and Robert C. Walker, Whitin Machine Works, Whitinsville, Mass.

Registration and reception committee includes the following: Chairman, C. A. Wyatt, Debevoise-Anderson Co., Boston; treasurer, Frank Kumer, Springfield Facing Co., Springfield, Mass.

Participating with Massachusetts Institute of Technology and New England Foundrymen's Association, as co-sponsors of the conference, are the following: American Foundrymen's Society; Boston Chapter of the Non-Ferrous Founders' Society; Connecticut Foundrymen's Association; Connecticut Non-Ferrous Foundrymen's Association; Massachusetts Institute of Technology Student Chapter of the AFS; American Institute of Mining and Metallurgical Engineers; American Society for Metals American Welding Society; and American Industrial Radium and X Ray Society.

Training Book Is Published

Executives of Johnson & Johnson, New Brunswick, N. J., manufacturers of hospital supplies, have written a book devoted to the improvement of teamwork and of productivity throughout business and industry. Entitled *Training Employees and Managers for Production and Teamwork*, the book recently was published by Ronald Press.

Authors are William McCord, director of industrial relations, Personal Products, a J & J subsidiary; Dr. Earl Planty, executive counsellor, J & J; and Dr. Carlos Efferson, staff training director, Chicopee Mfg. Corp., another J & J subsidiary.

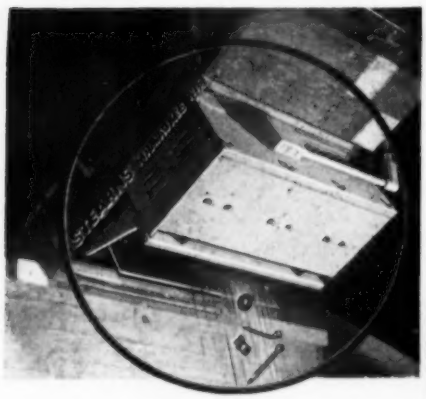
The book emphasizes the need for co-operation, teamwork and increased productivity in all areas of life today and goes on to tell how to obtain it through training of all types, from elevator operation and bed making to filing, courtesy, interviewing, packaging, loom fixing, and report writing. On the supervisor and executive level there is training in grievance handling, constructive discipline, morale building, costs and finances, planning and organizing, conference leadership, self-improvement, waste reduction, labor relations and many other subjects.

Book Review

Welding Metallurgy, by O. H. Henry, G. E. Claussen and revised by G. E. Linnert, cloth, 505 pages, 5 x 7¾ in., published by American Welding Society, 33 West 39th St., New York 18. Price $2.50.

This new edition includes information on the processes which have been introduced since the first edition was written in 1940. It covers inert-gas metal-arc welding, and offers more information on the metallurgy of specific materials such as the stainless, heat-resisting, and stainless-clad steels.

A short bibliography is included at the end of each chapter to suggest sources of additional information. Also questions on each chapter are provided at the end of the book. Fundamentals of metallurgy are discussed in the first chapters for those having no previous knowledge of metallurgy, and the entire book is written in simple language so that it might be useful for both technical and nontechnical readers.



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YOUR MACHINERY!

TRAMP IRON RECOVERED IN 4 HOURS OF OPERATION!

JUST FOUR HOURS of operation recovered this amazing amount of tramp iron at the Fleischmann Malting Company with a Stearns Electro-Magnetic Spout Type Separator. Protect your machinery, avert possible shut-downs and costly repairs — remove all the tramp iron with a Stearns separator.

Tramp iron is automatically discharged by simply opening and closing the control switch. No time is lost, no hand scraping.

For continuous maximum magnetic strength, select a Stearns separator. No tramp iron can escape their deep, strong field. Low initial and operating costs.

For complete specifications and operating data on Stearns Electro and Permanent Magnetic Spout Type Separators, write for bulletins.

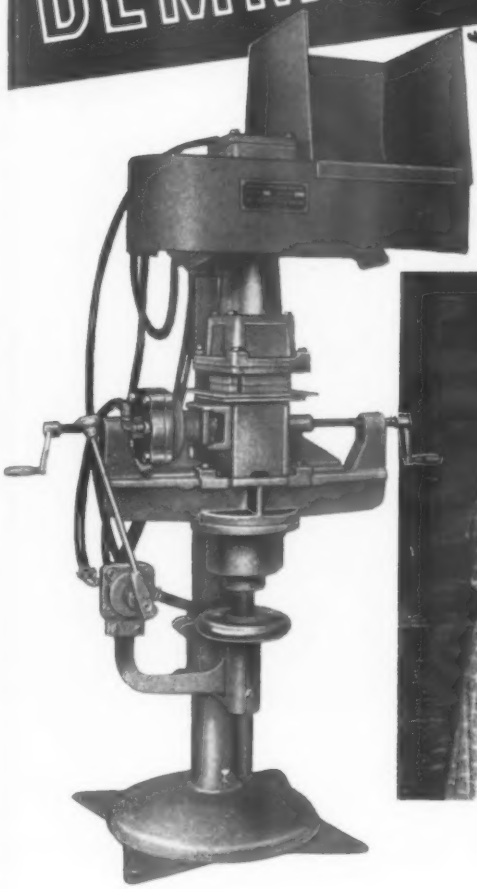
Stearns MAGNETIC MANUFACTURING CO.

662 S. 28th St., Milwaukee 4, Wis.

DEMMLER No. 55 CORE BLOWERS

CUT CORE BLOWING COSTS 30%

FOR PEORIA MALLEABLE CASTINGS CO.



Anna Gerhards and Dewey Rakestraw of Peoria Malleable Castings Co. are seen at their DEMMLER NO. 55's. Being blown are chain cores and ball type trailer hitch cores.

Here, indeed, is a real success story — one that every foundry can share.

It concerns Peoria Malleable Castings Co. of Peoria, Illinois, who, through the purchase of six DEMMLER NO. 55 Core Blowers, reduced their small core blowing costs by 30%!

Peoria Malleable Castings had previously used other makes of small core blowers, but now DEMMLER NO. 55's carry the load — efficiently and profitably.

Quality of cores produced by the DEMMLER machines, reports Peoria Malleable Castings Co., is excellent, being extremely uniform and far superior to that of hand made cores.

The experience of Peoria Malleable Castings Co. is not an isolated case. Hundreds of other foundries are also enjoying the "extra profits" DEMMLER NO. 55 Core Blowers make possible.

Are you one of them?

Features

- Ideal for short run jobs
- Quick, easy adjustments for raising table and moving chuck jaws
- Sliding, quick change blow plates
- Trouble-free diaphragm type blow valve
- Sand magazine and carriage of aluminum castings, with ball bearings
- Will accommodate boxes 9 inches long — handle cores weighing up to 4 pounds
- A single hand valve operates both vertical and horizontal core box clamps and blows the core
- Moderately priced

Write for illustrated DEMMLER NO. 55 specification sheet — today!

Wm. DEMMLER & BROS.
KEWANEE, ILLINOIS

MANUFACTURERS OF CORE BLOWERS EXCLUSIVELY SINCE 1911

Above—Over a thousand screws are used in assembling this pattern for a cutter's spider for dredging. Time saved through use of electric screw driver is estimated at 15 hours

Below—Pattern for water main valve body on a large hydroelectric project requires approximately six gross screws. Estimated time saved is 10 hours

Electric Impact Tools

Make Efficient Power Screwdrivers

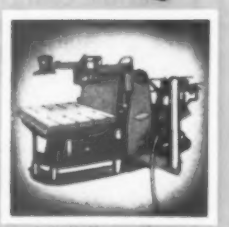
ELECTRIC impact tools recently developed by Ingersoll-Rand Co., New York, have found application in pattern shops as power screwdrivers, resulting in time and cost savings and in reduced operator fatigue. Several models now are on the market, and the original model has been in use for about 18 months, providing data concerning the application of that type of tool to patternmaking and remodeling.

At the Olney Foundry Division, Link-Belt Co., Philadelphia, one of the tools is being used in pattern construction and repair, with savings claimed to be at least 25 per cent of the time usually required with an ordinary screwdriver.

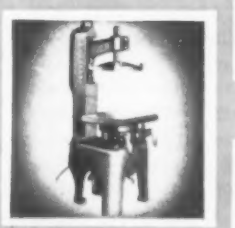
The screw-driven operation in rebuilding and repairing patterns at Birdsboro Steel Foundry & Machine Co., Birdboro, Pa., is said to be done in half the time and at reduced cost with the new tool. The company estimates that approximately eight out of ten pattern orders specify revision of patterns previously built in the shop, so that castings may be altered for product improvement or to fit new production methods. Time savings are twofold in such remodeling jobs, where it is necessary to dismantle a pattern to make a change and then reassemble it to conform to the new specifications, because the reversible motor with which the tool is equipped makes possible removal of screws as quickly as putting them in.

Additional features of the tool include a universal motor which operates on alternating or direct 110-volt current; a 22-volt model also is offered. Extra power is available when the screw is being driven into hard wood, strikes a knot, or otherwise meets resistance. Under such conditions the impact principle automatically operates, delivering 1900 rotary hammer blows per minute to the work. There is a minimum of torque reaction or kick-back because all power is delivered to the job through an accumulator-hammer-and-anvil mechanism, whereby a rugged hammer spring is compressed and then suddenly released. The energy is transmitted to the spindle in a series of intermittent rotary impacts. And finally, the tool is said not to break the slots on screws.

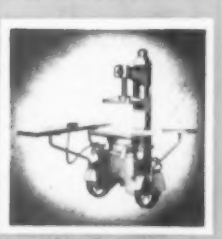
Jolt Rollover Draw, Model A



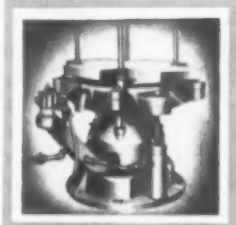
Jolt Rollover Draw, Model SA



Jolt Squeeze, Model 10-JX (stationary)



Jolt Squeeze, Model 10-JX (portable)



Jolt Pin Lift Model AJS (stationary)

Jolt Pin Lift Model AJS (portable)

Why Hurry?

Every hour your men waste unnecessary time with hand operations, you lose. You must mechanize to meet the struggle of competition.

The fight is on—not between Russia and the United States, but between finished products that will deliver the biggest quality dollar value to the consumer.

If you can reduce your costs, you must. It is the battle of production.

Let us send you information on "Davenport" modern, time saving molding machines. They will save you money. Better hurry!

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DYNAMIC VS. STATIC PROPERTIES

(*Continued from page* 74)

condition which it has at fracture—the relation might be expected to be good. This is the only static property which reflects the ability of the metal to deform under triaxial stressing. Although elongation is measured on the broken bar, it is the sum of the elongation during uniform straining plus the elongation developed in the neck integrated over the full gage length. Consequently, it is not as reliable a measure of the ductility throughout the test as the reduction of area. Again the simplest relation is of the form (2): $C = a + bR$.

Following the procedure outlined for the Charpy-tensile strength relation, curves of this type were fitted to all the data and then to the data separated by type of heat treatment. The correlation coefficients in all three cases were statistically significant. The improvement of fit is shown b the standard errors of estimate in th third line of Table II. The graph for quenched and tempered and fo normalized and tempered steels ar given in Figs. 3 and 4, respectively Separation of the data by heats wa inconclusive.

Charpy-Tensile Strength-Reduction of Area Relations — In view of the fact the Charpy value has been shown to be related to both the tensile strength and the reduction of area, it seems possible that a regression of Charpy value on both the other variables might be interesting and useful. Continuing to work with linear functions, the type of equation tried was (3): $C = a - bT + cR$.

The last line of Table II shows the improvement in fit obtained. All the correlation coefficients were statistically significant and the best so far obtained.

Separation of the data by heats was unsatisfactory. When planes were fitted to the data for individual heats the standard errors of the regression coefficients were of the same order of magnitude as the coefficients themselves.

Curvilinear Relations—By testing the data for linearity it was found that the Charpy-reduction of area relation was linear but the tests showed that the Charpy-tensile strength relation was not. Again the form of equation had to be empiric. By plotting the data on various forms of graph paper it seemed that one of the following relations might obtain.

$$C = a + bT + cT^2 \quad \ldots\ldots\ldots (4)$$

$$C = \frac{a}{T^b} \quad \ldots\ldots\ldots (5)$$

$$C = a + b \log T \quad \ldots\ldots\ldots (6)$$

By the methods of least squares, curves of each type were fitted to the quenched and tempered steels and to the normalized and tempered samples. In each of these cases the three equations gave almost identical standard errors of estimate, and when the curves were plotted it was found that they were practically coincident in the range of the data. In view of the similarity of result it was decided that the polynomial could be used as well as either of the other two forms of equation and would have the advantage of being easier to handle since it does not involve logarithms or fractional powers of T. Standard errors of estimate for this type of equation are given in Table II.

Comparison with the corresponding values of standard error of estimate for linear relations between Charpy and tensile strength shows the improvement predicted by the

Photo at left: A cross section of unit showing discharge pipe (A), induction channel where pressure is created (B), pouring spout (C), and mold (D).

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Photo at right: Closeup of the pumping unit.

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linearity test but the prediction is still not as good as that produced by the Charpy-reduction of area equations nor the regression planes.

The dotted, curved lines in Figs. 1 and 2 are the loci of these equations.

In view of the improvement obtained by use of the plane it would seem logical to try a surface of the form (7): $C = a - bT + cT^2 + dR$. But when the residuals from the above equations were correlated with the corresponding reductions of area, the correlations were found to be not statistically significant. The reason for this seems to be connected with the form of the tensile strength-reduction of area relations.

These equations were found to be the type (8): $R = a - bT + cT^2$. After fitting equations of this form for both types of heat treatment, the right-hand members were substituted for R in the equation of the form of equation (2). The results were of the form of equation (3). Comparison of the regression coefficients and constants in the equations so determined with those in the equations calculated directly from the data showed remarkable agreement for quenched and tempered steels but rather poor agreement for normalized and tempered steels.

This may explain the inability to obtain an equation of the form: $C = a - bT + cT^2 + dR$, since the regression—$C = a - bT + cT^2$—is in effect merely another form of the regression of Charpy value on reduction of area.

Discussion of Results — Since the correlation coefficients of the regressions of Charpy value on tensile strength, reduction of area or both are all statistically significant, it may be said that the Charpy is related to these commonly determined tensile properties.

Consideration of Table II suggests that there may be some merit in considering the data separated by heat treatment. Except for the plane of regression, the standard error of estimate is better for quenched and tempered steels than for normalized and tempered steels.

Quenched and Tempered Steel—For these steels it has been pointed out that the curvilinear tensile strength relation is merely another form of the Charpy-reduction of area regression. It may be noted in Table II that the use of the plane of regression does not materially improve the fit of the equation over that found for the Charpy-reduction of area equation. The two equations were found to be:

$$C = 0.138 + 0.509R \quad \ldots\ldots (2a)$$

and $$C = 6.23 - 0.31T + 0.45R \quad (3a)$$

In these equations C is expressed in foot-pounds, T in 10,000 pounds per square inch and R in per cent.

Although the constants are quite different, the coefficient of tensile strength is small in the second of these equations and the coefficient of reduction of area is approximately the same in both.

That the reduction of area plays so important a role in the calculation of Charpy might have been expected since it is the property measured at fracture. This fact is not at variance with the information in the literature.

Although the plane of regression is the preferred form for quenched and tempered steels, for practical purposes the simple regression of Charpy value on reduction of area may be used.

Normalized and Tempered Steels—In the case of these steels the plane of regression is clearly a better fit than either the regression of Charpy on tensile strength or on reduction of area. It will be remembered that the curvilinear regression on tensile strength was not shown to be the

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equivalent of the relation between Charpy value and reduction of area. This lends support to the idea that the two independent variables are needed to compute Charpy values.

The equation of the plane is (3b): $C = 40.13 - 2.70T + 0.19R$, where the units are the same as before.

Bearing out the ideas expressed above, it will be noted that the coefficient of reduction of area is smaller than in the plane for quenched steels and that the coefficient of the tensile strength is much larger. In fact, the latter coefficient here is of the same order of magnitude as the coefficient of tensile strength in the Charpy-tensile strength regression.

It would seem then that tensile strength is a more important factor in normalized steels than in quenched steels.

Effect of Elongation and Yield Point—No details are included here but preliminary survey indicated that the reduction of area was better correlated with impact value than elongation. Hence no equations involving elongation were developed. An attempt to correlate impact value with the difference between yield point and tensile strength was also entirely fruitless.

Effect of Analysis—An attempt has been made to arrive at the effect of analysis by separating the data by heats. While the separation may well have introduced the effect of other variables such as melting, and deoxidizing practice, it would have been a start. Unfortunately, the attempts were unsuccessful.

A second approach was made by plotting the residuals, averaged for each heat against each of the elements in the heat. None of the plots showed any significant trend so the conclusion had to be that no effect of analysis could be shown.

Two explanations of this apparent lack of effect of analysis may be imagined. It may be that the effect of composition is mainly on the transition temperature and not on the magnitude of the Charpy value in the ductile or in the brittle condition. This is unsupported, particularly if we consider the alternative explanation.

It has been shown in previous work on these steels[11] that the constants in the tensile strength-elongation equation are functions of the amounts of alloying elements present. Since reduction of area is correlated with elongation, such a situation might be expected to exist in the case of tensile strength-reduction of area relation. More recent work[15] has shown that the tensile strength of these steels, normalized and untempered, is a function of the composition.

If then, the Charpy value is computed from the value of the tensile strength and the reduction of area, the effect of composition may be included in the values of the tensile properties and no further correction for analysis would be likely.

Conclusions—The Charpy value is shown to be related to tensile strength and reduction of area. For quenched and tempered steels the relation which produces the best fit is the plane: $C = 6.234 - 0.310T + 0.450R$, with standard error of estimate of 3.99 foot-pounds.

Normalized and tempered steels give the equation: $C = 40.125 - 2.696T + 0.188R$, whose standard error of estimate is 2.85 foot-pounds.

Both of these relations have statistically significant correlation coefficients.

The possible effects of composition have been discussed. These point toward the idea that if composition is adjusted to produce given tensile strength and reduction of area for a

(*Concluded on page* 219)

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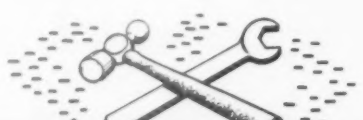

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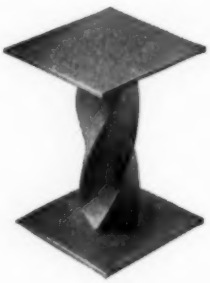

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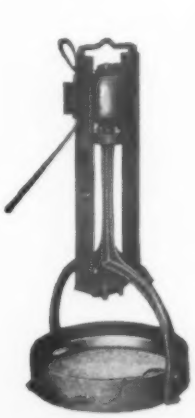

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(*Concluded from page* 216)

given type of heat treatment the Charpy value will then be determined by the tensile properties, not by the analysis.

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Note: This article is abridged from a thesis presented by the author in partial fulfillment of the requirements for the PhD degree at Case Institute of Technology. The investigation was conducted in the Research Department of the National Malleable & Steel Castings Co. under the direction of Dr. H. A. Schwartz.

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American Management Association, 330 West 42nd St., New York 18, has published a number of bulletins on miscellaneous subjects, which are available at the prices indicated: Production Series—"Basis of Production Planning," 50 cents; "New Controls for Fixed and Variable Costs," "Administrative and Statistical Techniques of Quality Control," "Building Worker Interest in Production Problems," "Organizational Teamwork in Production," 75 cents each; Personnel Series—"Personnel Functions and the Line Organization," 75 cents; General Management Series—"Worker Morale and Productivity," 75 cents; Packaging Series—"Primer on Basic Types of Shipping Containers and Interior Packing Pieces," and "Cost Controls for Packing, Shipping and Warehousing," 75 cents each.

Book Review

Conveyors and Related Equipment, by Wilbur G. Hudson, second edition, cloth, 468 pages, published by John Wiley & Sons, New York 16. Price, $7.

Since the operation of a foundry is concerned to such a great extent with the problems of materials handling, this revised text should be of interest. The descriptions include use and application of screw conveyors, flight and apron conveyors,

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Casting a Long Roll Grinder Bed

(*Concluded from page* 88)

just to be on the safe side.

After the metal had solidified, bolts were slacked off and binders removed to permit the casting to adjust itself according to natural contraction strains. In this particular instance the pattern was cambered 1⅛ in., and built with a contraction allowance of 1/12-in. per foot instead of the usual and fairly standard patternmaker's allowance of ⅛ in. per foot. When the casting was taken out of the mold it was perfectly straight and conformed to anticipated measurements.

On account of the long distance the metal had to travel, and the comparatively thin section of all the parts, three ladles, 10, 12 and 15 tons capacity were employed to pour the casting. The iron was melted in two cupolas, and taken to the mold, one at each end and one at one side near the center. By pouring simultaneously, the mold was filled in 70 seconds. Analysis of the metal showed: Silicon 1.28 per cent, manganese 0.8 per cent, phosphorus 0.20 per cent, sulphur 0.09 per cent, graphitic carbon 2.70 per cent, combined carbon 0.60 per cent.

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The style of gates, three at one end, four at the other end and a row along the side is shown in Fig. 5. The side gates were cut into the upper edge of the mold. At the ends, gate channels were cut in the joint to connect the sprues with gate cores set up close to the mold wall. These vertical dry sand gate cores were provided with two and three openings on the face to deliver metal to the longitudinal frame members, three for part of the distance, and four for the remainder. To some foundrymen, and because one gate is above the other, the gate is known as a step gate.

The mold was blackwashed and then skin dried with a number of gas jets to produce a clean skin on the casting. The skin drying also increased the strength of the sand to resist erosion from the flowing iron streams from the ends and from the center. A synthetic sand employed throughout the foundry on all castings of size and weight, was used to form the mold for this long grinder bed. The foundry is equipped with exceptionally complete sand handling facilities. The base sand is a silica sand No. 70 AFS fineness, permeability 108, green compression 11, moisture content 5 per cent.

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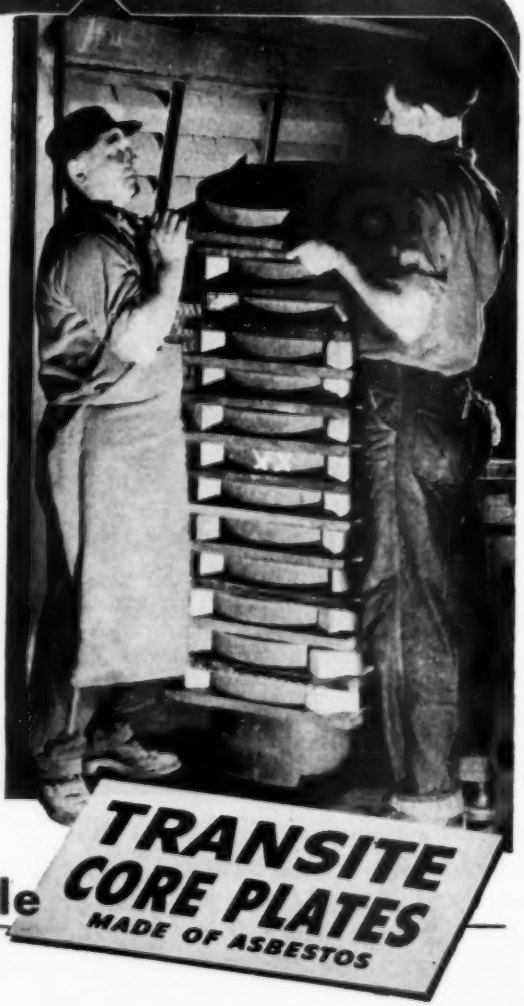

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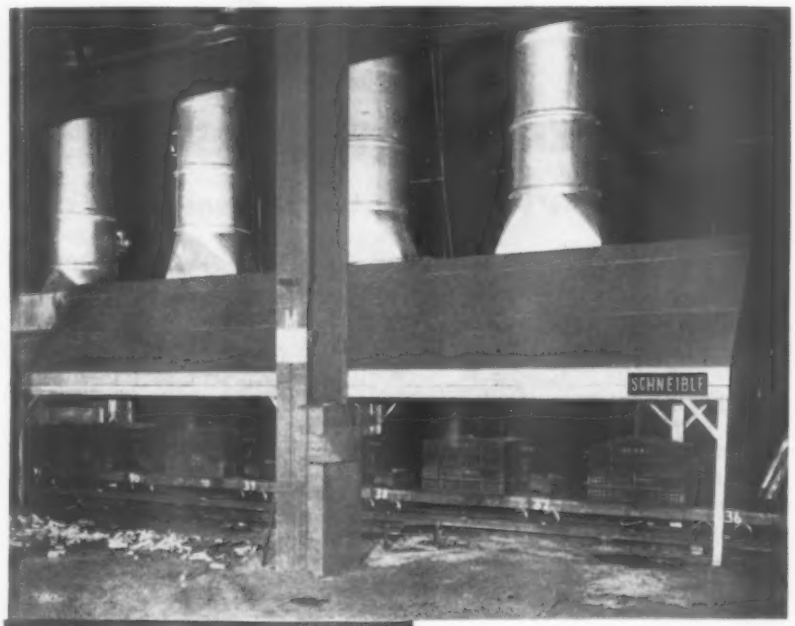

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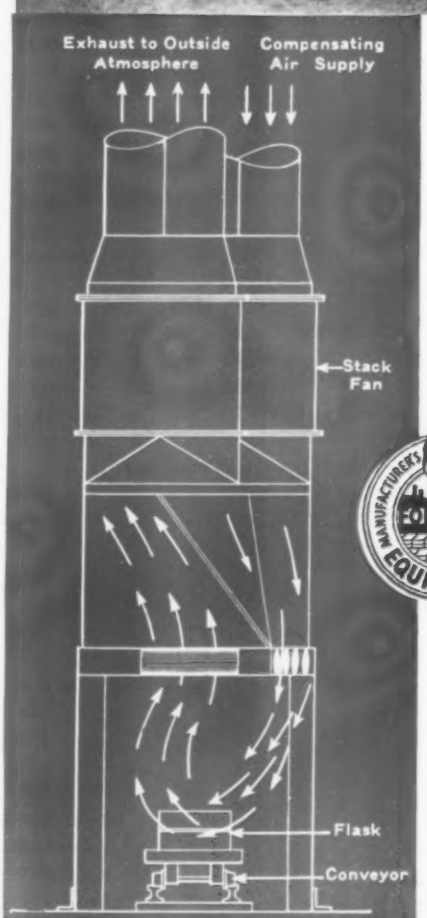

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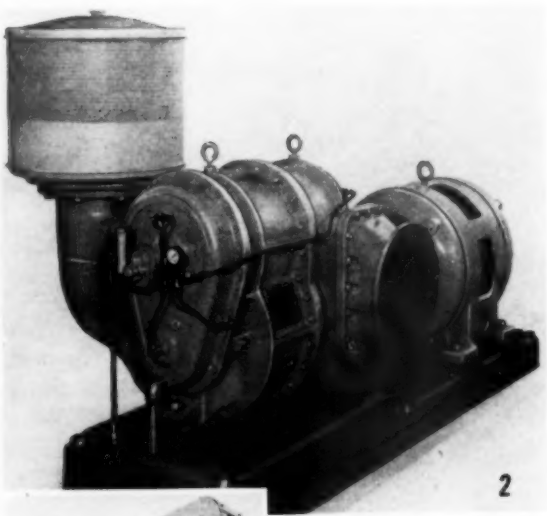
For More Details Circle No. 1—Page 225

1

(2)—Blower: Standard Stoker Co., 370 Lexington Ave., New York 17—Positive displacement blower available in capacities from 100 to 15,000 cfm is designed to deliver positive pressures up to 20 psi or to pull a vacuum. It is a lightweight, compact unit and because it may be operated at high speeds, lends itself to direct drive by standard motors. It takes in and discharges air smoothly and because of the oil sealing arrangement used, the discharged air is said to be clean.

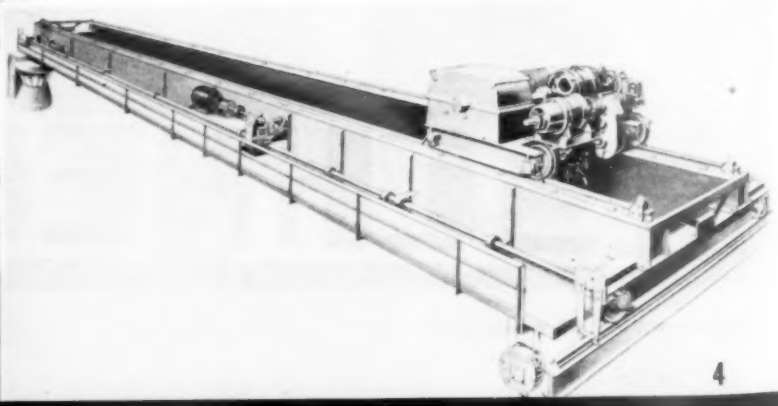
For More Details Circle No. 2—Page 225



2

(3)—Crane: Coles Cranes Inc., 4323 South Paulina St., Chicago — Crane is equipped with a plexiglass dome designed to give the operator complete visibility of the load on the ground as well as the surrounding area. The crane has a cantilever type boom with 360-degree swing. Standard boom lengths are 12 and 17 ft although special lengths up to 40 ft are available. Several crane models are offered with capacities from 1¾ to 15 tons. The model illustrated has 7½ ton capacity and is powered by a V-8, 47-hp gasoline engine. The crane has four motions: Hoist, boom hoist, swing, and travel, each operated by separate motors. All motions are controlled by a three-in-one con-

3



4

troller mounted immediately in front of the steering column. All cranes have an automatic safe load indicator which stops the action of the crane if the load is in excess of the rated load at a given radius. Hydraulic brakes in the rear wheels are operated by lever or pedal.

For More Details Circle No. 3—Page 225

(4)—Overhead Crane: Whiting Corp., 15607 Lathrop Ave., Harvey, Ill. — Three features characterize the company's overhead traveling cranes: Full-vision cab, simplified magnetic controllers, and fluid drive on both bridge and trolley motors. The operator is seated in a comfortable, nonfatiguing position in the cab and has lateral vision through an arc of 246 degrees. Crane operation is governed by short, fingertip levers actuating magnetic controllers. Use of such controllers requires that only low voltage be run into the cab, thus providing greater safety. Fluid drive couplings are said to permit the use of simple, inexpensive electric motors selected on a basis of actual running torque requirements. The fluid drive provides a cushion effect which protects motors and drive mechanisms against excessive starting loads, shock loads and overloads.

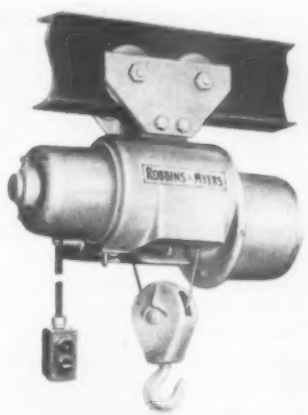
For More Details Circle No. 4—Page 225

Dust Collectors: Hammond Machinery Builders Inc., 1637 Douglas Ave., Kalamazoo 54, Mich.—Newly designed semiportable dust collectors are designed for use with a number of different grinding machines. Installation requires only piping to grinder with flexible metal tubing or metal pipe and one electrical connec-

tion. Starter may be connected to main grinder switch or operated by separate button. Motor and blower assembly are accessible by lifting a single plate. Dust-laden air is drawn from the grinder wheel hood through the air expansion chamber at the bottom of the cabinet, where the heavier particles drop into the dust pan. The air then is drawn up through a set of three fiber glass filters which remove the finer particles. Filters are of the "throw away" type and can be cleaned by shaking several times before being replaced, it is claimed. Filters are accessible through a door in the front of the cabinet. Cleaned air is recirculated in the room. The three dust collector models are powered by ¼, ½ and 1 hp motors with respective capacities of 330 cfm, 700 cfm and 1000 cfm.

For More Details Circle No. 5—Page 225

Hoists: Robbins & Myers Inc., 1345 Lagonda Ave., Springfield, O.—Wire rope hoists, suitable for stationary, hook, or trolley mounting, are offered in ¼, ½ and 1-ton capacities with pendent rope or push button control. All models are equipped with motors. An electrically activated, shoe type motor brake provides instantaneous stopping. An oversize Weston load brake, with nonreversing clutch, automatically controls speed when the load is lowered and prevents dropping in the event of power failure. Trolley assemblies are equipped with ball bearing wheels and are adjustable for various beam sizes.

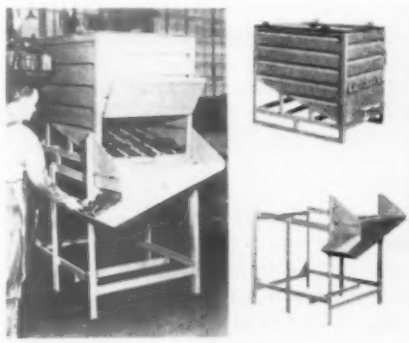


For More Details Circle No. 6—Page 225

Magnifier: Buhl Optical Co., 1009 Beech Ave., Pittsburgh 12—small, compact inspection glass is intended for critical inspections requiring an undistorted, color-corrected field. It has a 14-power, cemented three-element lens system measuring ½-in. in diam. Based on the Hastings formula, the lens elements are precision ground and centered to produce a flat, true image throughout the field of vision. The lens assembly is housed in a solid machined barrel which folds into a protective case. A spring in the hinge pin provides smooth folding action under constant tension. All metal parts, with the exception of the spring and two nickel-silver bushings, are made of solid brass, chrome plated.

For More Details Circle No. 7—Page 225

Sloped Bottom Box: Palmer-Shile Co., 16033 Fullerton Ave., Detroit 27—Sloped bottom box and stand are designed to simplify small parts handling. Parts loaded into



the box are released by a hand lever to slide down to a waist-high tray on the stand for easy disposal by standing or sitting workmen. Box is constructed of steel and is equipped with crane lugs for convenient pick-up and carry. Bottom slide opening is locked by the lever until released. It may be built any size to fit any type lift truck, fork or platform. The separate stand is made of angle steel.

For More Details Circle No. 8—Page 225

Electrode Holders: General Electric Co., Schenectady 4, N. Y.—Six new electrode holders for the inert-arc process, one for machine welding and five for manual welding, have been developed. For manual welding they include a 100-amp air-cooled model with spring type collets, metal nozzle, and gas-tight, heat-resistant gasket; 200 and 400-amp water-cooled models with split copper collets, ceramic nozzles and gas-tight, heat-resistant gaskets; a 400-amp model furnished with one electrode metal nozzle, furnished with tips of two orifice diameters; and an 800-amp model furnished with on electrode assembly for each size listed and with three water-cooled metal nozzles, one for 5/16 and ⅜-in. electrodes, one for 7/16-in. electrodes, and one for ½-in. electrodes.

For More Details Circle No. 9—Page 225

Tilting Furnaces: Bellevue Industrial Furnace Co., 2971 Bellevue Ave., Detroit—Reverberatory tilting furnaces for melting ferrous and nonferrous metals have capacities of 350 to 20,000 lb and are designed to produce from 13 to 21 melts per day.

Metal in any form may be charged continuously and is preheated and melted in suspension in the hopper and then trickles down into the metal bed. Consequently no cold metal reaches the molten bath. The combustion chamber is heated by the same fuel as is used to melt the metal in the hopper, and atmospheric conditions in the combustion chamber are kept under close control to eliminate occluded gases. Furnaces may be lined with basic or acid refractories. Furnaces may be fired with either oil or gas and are shipped as self-contained units, complete with burner, blower and motor, and air ram. Hydraulic or compressed air automatic tilt are available for furnaces with capacities over 1000 lb of brass. Hand tilting is employed in furnaces with capacities of less than 100 lb of brass,

For More Details Circle No. 10—Page 225

Develops New Dielectric Sand Core Drier

A NEW dielectric sand core drier has been developed by Allis-Chalmers Mfg. Co., Milwaukee. The unit consists of a radio frequency heater, an oven with electrodes, tuning assembly, ventilating system and end conveyors for loading and unloading. It is particularly adaptable where resin binders are used.

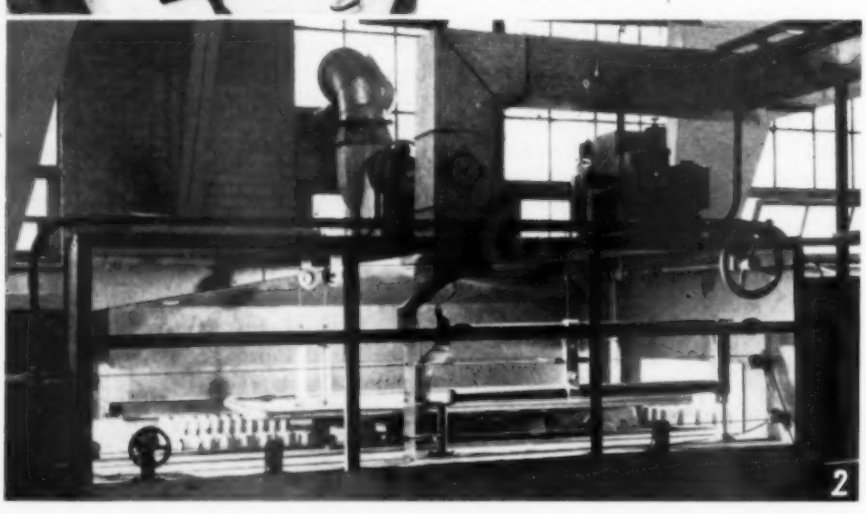
It is claimed that core making techniques need not be modified when changing from conventional oven methods to dielectric core drying. A fairly wide range of core sizes can be handled successfully by this method since the heat is developed uniformly in the core. Time involved varies from 2 to 20 minutes depending upon the average size of the core handled.

Green cores may be placed on the in-feed belt of the unit as soon as they are made and dried cores taken from the belt to the sorting table or directly to the molding floor without cooling, thus eliminating the need for cooling and storage space. Where dielectric heating is employed in core drying, heat radiation into the room is said to be negligible and gases are exhausted outside the building.

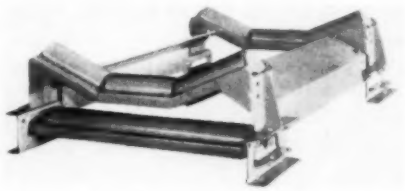
Installation of the unit is simple, requiring only that it be connected to the power source. Full output is available in 30 seconds—the time required for heating of the tube filaments.

Fig. 1 shows the unit in operation with the dielectric heater (upper right) installed separate from the dryer away from gas, fumes and heat. Fig. 2 is an interior view of the drier with a representative load of various sized cores passing under electrode. Large handwheel in upper right hand corner controls electrode height and tunnel aperture. Lower left handwheel tunes equipment. Excess heat, gases and fumes are evacuated through the blower seen in back of the transmission line housing.

For More Details Circle No. 11—Page 225



Belt Conveyor: Transall Inc. 109 North Eleventh St., Birmingham 4—Conveyor units feature minimum heights of head section, main chassis and tail section; spill shields to protect the belt; compact power and drive unit; self-cleaning tail pulley; short, maneuverable tail section, and return idlers assembled in a composite unit with the troughing idlers. The sections are suited to installations where they have to be moved frequently, as they do not rely on permanent support structures. Structures required for permanent installation of conveyor are simple. Idler rollers have precision ball bearings with sealed-in lubricant said to be nonoxidizing, nonemulsifying and to



retain its viscosity through a wide range of temperatures. Rolls are cushioned in Neoprene. Idler mountings are of standard widths and are available as individual idlers or assembled into unit sections.

For More Details Circle No. 12—Page 225

Desiccator: Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4—Desiccator, designed for fast cooling, is constructed of aluminum with wall sections averaging ½-in. thick. It measures 10½-in. ID and 3¼-in. deep. The silica gel desiccant is stored in a 500-mesh wire cloth bottomed pan clipped inside the cover. It may be removed and the moisture driven off in an oven. There is no handling of loose desiccant. Mating surfaces of the bowl and cover are machined flat and smooth for an air-tight fit. A check valve air inlet is incorporated in the lid above the desiccant chamber to avoid formation of a partial vacuum in the unit.

For More Details Circle No. 13—Page 225

Electrode: Hobart Bros. Co., Hobart Square, Troy, O.—New class E-6020 electrode is designed for making high-speed tack welds on heavy weldments without the necessity of breaking the excess coating from the end of the electrode each time the arc is started or restarted. It is said that, in most cases, touching the electrode tip to the work piece is sufficient to restart and maintain the arc. It also is claimed that its concentrated and forceful arc makes the electrode exceptionally good for scrap

(*Continued on page* 228)

HELPFUL LITERATURE

50. Sand Conditioning

Pettibone Mulliken Corp., Beardsley & Piper Div.—4-page illustrated bulletin No. 1315 depicts applications of models L, M and S Screenarator sand conditioners and lists their respective specifications.

51. Motor Protection

Allis-Chalmers Mfg. Co.—8-page illustrated bulletin No. 51B6210B describes design and construction features of Safety-Circle motor which assure long life and low operating cost. Dripproof and splashproof motors are listed in sizes ranging from 1 horsepower at 1800 revolutions per minute to 20 horsepower at 3600 revolutions per minute in frames 326 and smaller.

52. Process Instruments

Foxboro Co. — 32-page illustrated bulletin No. 427 presents details of complete line of Dynalog instruments for process measurement and control as well as various auxiliary devices which adapt these instruments to diverse industrial applications. Units are shown for checking temperature, humidity, conductivity, pressure, flow, liquid level, force, position, speed and other process variables.

53. Electric Lift Trucks

Barrett-Cravens Co.—8-page illustrated bulletin 4861 presents improved Ox line of lift trucks which both lift and travel electrically. Three battery-powered units are described with full specifications and illustrations including operating views and closeups of electrical and mechanical features.

54. Oil Burners

Hauck Mfg. Co.—8-page illustrated catalog No. 409 describes series B low-pressure air-atomizing oil burners for manual operation and individual oil and air control. Wire range of sizes is available to handle from 0.2-gallon of fuel per hour with 8-ounce air pressure to 81 gallons per hour with 20-ounce air pressure.

55. Protective Helmet

W. W. Sly Mfg. Co.—Illustrated leaflet No. 97 describes Purair helmet for use in sand and grit blasting operations. It is lightweight and comfortable, has wide range of vision and permits complete freedom of head movement.

56. Flexible Shafting

Elliott Mfg. Co.—16-page illustrated catalog No. 49 covers flexible shaft machines incorporating 1/3 to 3-horsepower motors. Unit drives, attachments and push-pull controls are described also.

57. Abrasive Products

Carborundum Co.—32-page illustrated book is entitled "The Finest in Coated Products". In it are presented features of company's new service, research and production facilities for abrasives and abrasive products.

58. Core Sand Mixing

Werner G. Smith Co.—5-page technical bulletin No. 102 on core sand mixing gives recommended order for addition of sand, cereal, flour, water and core oil to mixer, based on maximum green and baked strength of cores. Included is information on how mulling time affects results.

59. Grinding Wheel Speeds

Grinding Wheel Institute—18-page illustrated booklet entitled "Safe Speeds for Grinding Wheels" presents discussion of established rules governing safe operating speeds and is prepared especially for use of grinding machine operators and others responsible for control of grinding wheel speeds.

60. Ferro-Alloys

Electro Metallurgical Div., Union Carbide & Carbon Corp.—64-page illustrated pocket-size booklet "Electromet Products & Service" presents information on chromium and ferrochrome; manganese and ferromanganese; silicon and ferrosilicon; and vanadium, tungsten, zirconium, columbium, boron, calcium, titanium and other ferro-alloys. Sizes, storage, pricing and shipping of alloys are discussed also.

61. Refractory Products

A. P. Green Fire Brick Co.—82-page illustrated booklet P-32 describes fire-clay materials and industrial insulation. Indexed publication lists fire-clay, super duty, high alumina and insulating fire brick; special shapes; mortars; castables; coatings; plastics and insulation.

ADDITIONAL INFORMATION?

For additional information on any of the items described under "New Equipment and Supplies", "Trade Publications" or "Helpful Literature" in this issue — simply circle their corresponding item numbers on one of these cards.

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62. Man Coolers

American Machine & Metals, Inc., De Bothezat Fans Div.—8-page illustrated bulletin "Hy-V Air Jet for Foundries, Forge Shops & Steel Mills" explains advantages of this column-mounted man cooler which has long range, concentrated air stream. Sizes are available for delivering up to 11,420 cubic feet of air per minute.

63. Cherry Snap Flasks

V-G Flask & Fitting Co.—4-page illustrated price list No. 48-A gives current prices for various sizes and models of cherry snap flasks and discusses improvements in design. Specifications for various types are listed also.

64. Melting Furnaces

Stroman Furnace & Engineering Co.—4-page bulletin No. 90 depicts and describes stationary crucible melting furnaces with capacities from No. 20 to No. 400 crucibles. Usable for brass, bronze, aluminum and other alloys, furnaces have push back, swing or counter-balanced covers.

65. Cope & Drag Patterns

Precision Pattern Works—4-page illustrated folder is entitled "The Buyer's Guide for Cope and Drag Patterns." It contains data on wood and metal patterns from small pipe fittings to any size product. Methods of manufacture are illustrated and pattern types discussed.

66. Air Compressor

Air-Flo Compressor Co. — 30-page illustrated catalog No. 10 presents data on standardized air compressor for automotive and industrial purposes. Outfit of 24 principal parts builds complete line of 108 different models of 1, 2, 3, 4 or 6-cylinder pumps with long or short stroke; single or two-stage; in sizes from 1 to 40 horsepower with 2 to 275-cubic foot capacity at 30 to 300-pound pressure; in vertical, V-type or side angle construction; and with single, twin or radial staggered cylinder arrangements.

67. Lifting Device

Pucel Enterprises, Inc.—4-page illustrated bulletin on Gonser Grizzly lifter explains how this device, with its various interchangeable attachments, will handle difficult materials lifting, lowering, leveling and transporting operations. Design permits adjustments to maintain perfectly balanced lifting and lowering of work at any desired angle, regardless of weight distribution.

68. Sand Conditioner

American Wheelabrator & Equipment Corp.—16-page pocket size illustrated booklet discusses advantages of Sandcutter machine which conditions sand in accordance with requirements for moisture, bond and permeability. Whirling blades thoroughly mix, aerate and cool sand.

69. Aluminum Foundry Flask

C. S. Humphrey Co. — Illustrated information sheet presents features of all-aluminum Flexo-Flask available in wide range of sizes. Copes and drags fit together in innumerable combinations to accommodate wide variety of sizes of molds.

70. Portable Power Tools

Independent Pneumatic Tool Co.—4-page illustrated circular JE 1063 describes Thor Silver Line of portable electric tools, including universal electric ⅜-inch impact wrench, saws, drills, grinders, sanders and polishers.

71. Welding Accessories

Air Reduction Sales Co.—15-page illustrated catalog covers both oxy-acetylene and electric arc welding accessories including goggles hose, spark lighters, gloves, electrode holders, cable, weld cleaning tools, helmets, face shields and many other items.

72. Industrial Trucks

Automatic Transportation Co.—8-page illustrated condensed catalog presents characteristics and performance figures of entire line of industrial trucks. These are Automatic, Skylift and Transporter types, latter including Transporters, Transtackers, Transtractors and Transrider Stacker.

73. Blast Cleaning Equipment

Pangborn Corp. — Illustrated bulletin No. 300A is accessory catalog to aid in selection of equipment for blast cleaning of metals and other equipment. Numerous safety accessories and expendable supplies are completely identified so as to facilitate ordering.

74. Alloy Chain

S. G. Taylor Chain Co.—12-page bulletin contains complete specifications on ¼ to 1¾-inch diameter alloy chain. Working load limits, definitions, recommended use and details of chain service for Taylor Made alloy steel chains, sling chains and attachments are covered.

75. Sand Arrester Tube

Martin Engineering Co.—Illustrated folder "Save Cores, Castings and Time" deals with Peterson sand arrester tube which is available in any size or length. It is copper plated to prevent rust and to give gallproof surface for pressing into blow plate and core box.

76. Diecasting Machine

Cleveland Automatic Machine Co. —4-page illustrated bulletin 400 gives features and specifications of model 400 universal high pressure hydraulic diecasting machine for zinc, tin or lead. Hot metal end can be changed to convert to cold chamber machine, and model has 36 x 38-in. die plates, maximum die space of 26 in. and estimated locking pressure of 400 tons.

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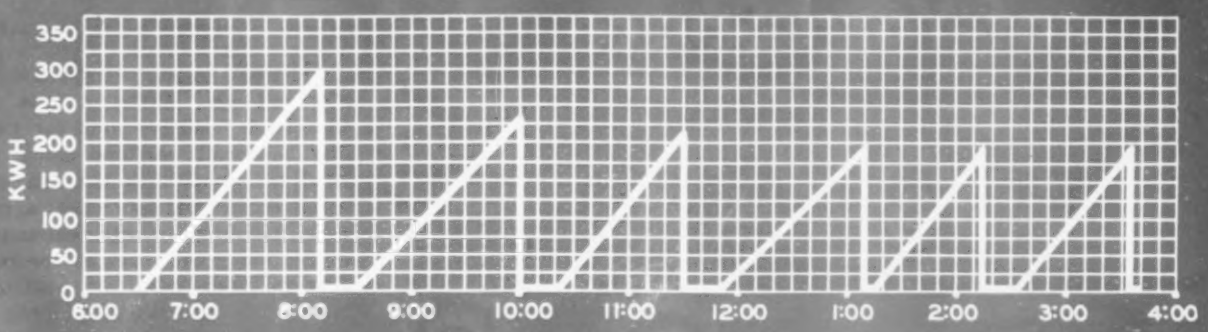
DETROIT ROCKING ELECTRIC FURNACE



NOTES ON DAILY OPERATION OF TYPE LFY, 700-LB. CAPACITY DETROIT ELECTRIC FURNACES MELTING NICKEL:

TOTAL HOURS OPERATION—9¼ hrs.; NUMBER OF HEATS—6; WEIGHT PER HEAT—900 Lbs.; TOTAL METAL MELTED—5450 Lbs.; TOTAL KILOWATT HOURS—1323; KILOWATT HOURS PER TON—486.

PROFITS FROM DETROIT ELECTRIC FURNACE OPERATION IN PAST YEAR: $150,000.00.

NOTES ON TWO-YEAR OPERATION OF SAME FURNACES:

COMPANY—A Well-Known Automotive Plant (name on request); PERIOD—(Sept. 9, 1946 to Sept. 18, 1948); TOTAL TONNAGE MELTED—1,970; AVG. ELECTRODE USAGE—8.65 Lbs. per Ton of Nickel at .23/Lb.—$1.99; AVG. POWER CONSUMPTION—625 KWH/Ton at 1¼c—$7.81; AVG. REFRACTORY COST—$4.00/Ton.

AVG. TOTAL MELTING COST OVER TWO YEARS: $13.80 PER TON.

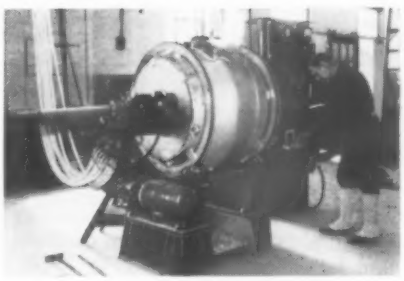
Maximum QUALITY CONTROL • *Low* MELTING COST

FOR FERROUS AND NON-FERROUS METALS

This record is typical of annual savings obtained with Detroit Rocking Electric Furnaces. An important additional advantage is the fine degree of quality control obtained in every melt.

Other economical features are: optimum power use and all-electric operation eliminating handling and storing of messy, bulky fuels; positive control of melting speed, quality and composition; exact duplication of previous melts; and control of other melting factors. Out-of-production time is minimal. Burned-out linings are quickly, easily replaced by spare, previously-lined furnace shells.

Fast, always uniform outputs and low metal losses by shrinkage save production time, labor and expense. Shop borings, turnings and scraps are reduced with least loss from oxidation.



The electric arc is automatically established clear of the molten bath at all times. The metal never becomes a part of the electric circuit. This method assures uniform temperatures within the melting chamber.

Detroit Rocking Electric Furnaces are available with automatic electrode control and automatic rocking control. There is a wide range of sizes to choose from . . . from 10 to 4000-lb. capacities. Chambers are of conical or cylindrical type. All furnaces are individually designed to meet your plant electrical specifications.

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Foreign Representatives: In Brazil—Equipamentos Industriais "Fisa" Ltd., Sao Paulo; CHILE, ARGENTINA, PERU and VENEZUELA: M. Castellvi, Inc., 150 Broadway, New York 7, N. Y.; MEXICO: Casco, S. de R. L. Atenas 32 - Despacho 14, Mexico City, D. F.

For Better Use of Yard Space

NORTHERN MAGNET HANDLING, ELECTRIC OVERHEAD TRAVELING CRANES

Higher Speed You can handle more turnover in a given space, or a fixed turnover in less space, with a Northern Electric Overhead Traveling Crane. Desired higher operating speeds are available through various combinations of bridge, trolley, and hoist travel speeds.

Dependability You can make most advantageous use of yard space without fear of crane breakdowns. Yard cranes are purposely built and equipped for rugged, 24-hour continuous service. They have only the heaviest duty type bearings, gears, end trucks, highest quality motors, controls, and other electrical equipment.

Visibility Safer, better, faster load handling and stacking is possible because the operator has better visibility from the Northern Clear Vision Control Cab.

Low Cost Operation Northern Magnet Handling, Electric Overhead Traveling Cranes cost less to operate—have oil bath lubrication which eliminates necessity for daily lubrication and crane idle time—have fewer parts to wear out, fail, or replace.

When you investigate, ask for Bulletin No. 141-C.

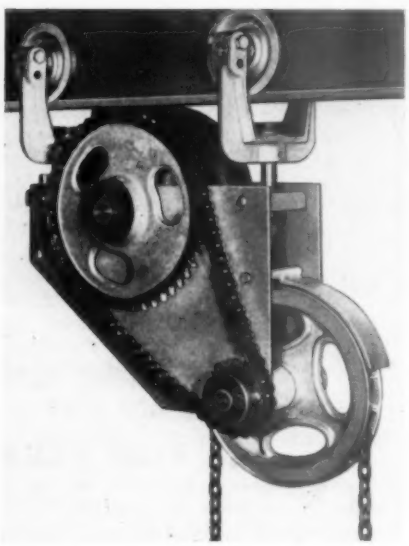
OVERHEAD ELECTRIC CRANES AND HOISTS ★ NORTHERN ENGINEERING WORKS ★ 2615 Atwater St., Detroit 7, Mich.

(*Continued from page* 224)

cutting. The electrode is offered in 14 in. lengths in ⅛, 5/32 and 3/16-in. sizes and 18 in. lengths in the ¼-in. size.

For More Details Circle No. 14—Page 225

Hand Drive Unit: American Monorail Co., 13104 Athens Ave., Cleveland 7—Drive unit for propelling monorail carriers along overhead track operates through simple hand chain and sprocket arrangement. Loads up to track capacity are moved along the track at the rate of 1 ft for each 28-in. overhaul of the hand chain. Normal movement of a 1-ton load on a monorail carrier may



be made with a 10-lb pull at the rate of 100 fpm. Unit is applicable where electric power is inaccessible and where tractor movement of a monorail load is advisable because of high elevation of track, precision spotting of load or excessive weight. (Note: The illustration accompanying the description of this unit, as presented in the August issue, was inverted.)

For More Details Circle No. 15—Page 225

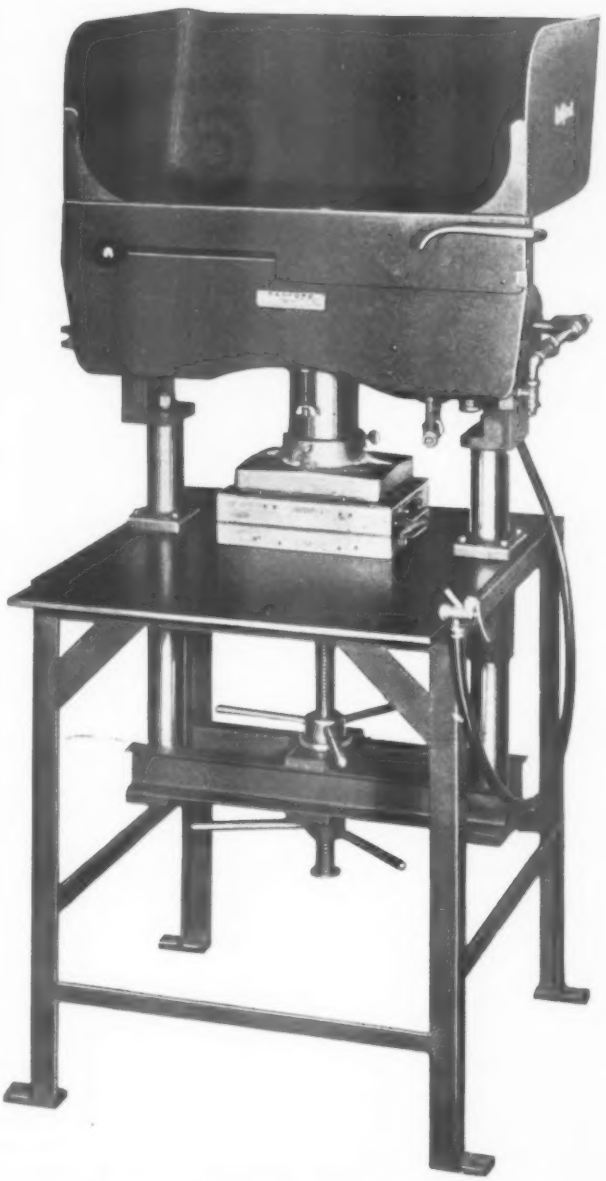
Shutoff Valve: Olin Gas Engine Co., 9 Lafayette Ave., Buffalo—Automatic safety shutoff valve for use on compressed air lines is made to fit standard connections and is inserted at the intake end of the air hose. When a break occurs in the hose or a tool is being changed the valve closes instantly and shuts off the pressure, permitting only a light stream of air to escape through a bypass. It is said to reduce the danger of accidents when a hose, under pressure, breaks and gets out of control. It also eliminates the necessity of turning off a valve before making repairs or for changing tools. When the hose is repaired the pressure will

(*Continued on page* 230)

The NEW

Redford NO. 2 CORE BLOWER

STATIONARY MAGAZINE TYPE



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More production with the new and original REDFORD NO. 2. New standards are being set, not only because the machine itself is fast, but because every motion of your operator has been correctly evaluated to obtain a maximum of production with a minimum of effort.

8 OUTSTANDING FEATURES:

1. Large stationary work area of convenient height. All work can be done right on the machine table, eliminating unnecessary handling of core boxes.

2. Large sand supply hopper directly in front of the operator and readily accessible.

3. Stationary sand magazine that has a unique loading device eliminating the usual time and effort consuming operation of moving the magazine from filling to blowing position.

4. Easy accurate locating of core boxes against stationary magazine heads.

5. Quick change magazine heads or Redford Sand Cartridges.

6. Quick adjustment for different height core boxes.

7. Quick change, fully adjustable, automatic clamping attachment for vertically split core boxes.

8.* Actuating one handle puts the machine through the complete cycle of clamping the core box, blowing the core and releasing the core box, in two seconds.

*Any core blowing machine will blow a core in a few seconds. Related operations and human fatigue are the important factors in setting your rate of production. The New Redford has been developed to give, both, unequalled performance and unequalled ease of operation.

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(*Continued from page* 228)

equalize on both sides of the valve and a spring opens it automatically. It is said not to restrict the flow or reduce the volume of air being used, and will operate under varying pressures. It also can be used for gases, steam and light liquids flowing under pressure. It is made of brass and will not corrode.

For More Details Circle No. 16—Page 225

Pallet Crane: Grand Specialties Co., 3135 West Grand Ave., Chicago 22—Portable pallet crane is designed for handling shipping cases and barrels in and out of trucks or cars, handling patterns to shelves in foundry pattern vaults, and lifting and transporting dies, coils, motors, engines, castings and other items in

and around shops or warehouses. Heavy steel plate 16 x 24-in. pallet, capable of handling large, heavy, bulky objects up to 500 lb, lowers to floor level and elevates to a maximum height of 5 ft, 6 in. It can be stopped at any intermediate height. Regularly supplied with a hand hydraulic lift for easy operation, the unit also can be supplied with a motorized hydraulic lift.

For More Details Circle No. 17—Page 225

Water Cooler: Filtrine Mfg. Co., Dept. CC, 53 Lexington Ave., Brooklyn 5, N. Y.—Water cooler is built with reinforced angle-frame support, with bonderized steel exterior of wrap-around design. It is insulated with 3 in. of corkboard and additional packing of finely regranulated cork, all sealed with hydrolene. It has a removable front panel for access to mechanisms and the top is stainless steel with drain that is said not to crack, chip or break. It is equipped with two sanitary type, stream height controlled bubblers and can be furnished with an auxiliary faucet for filling containers and buckets and for saturating towels

(*Continued on page* 232)

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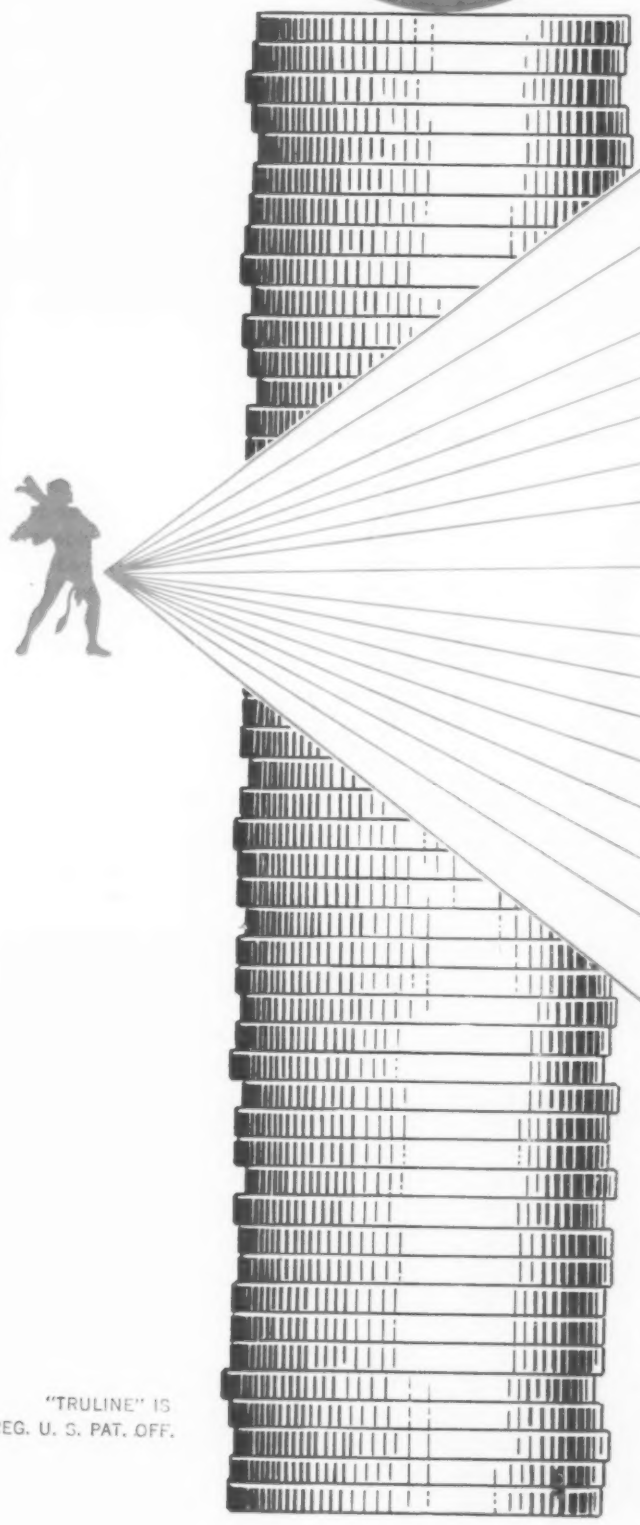

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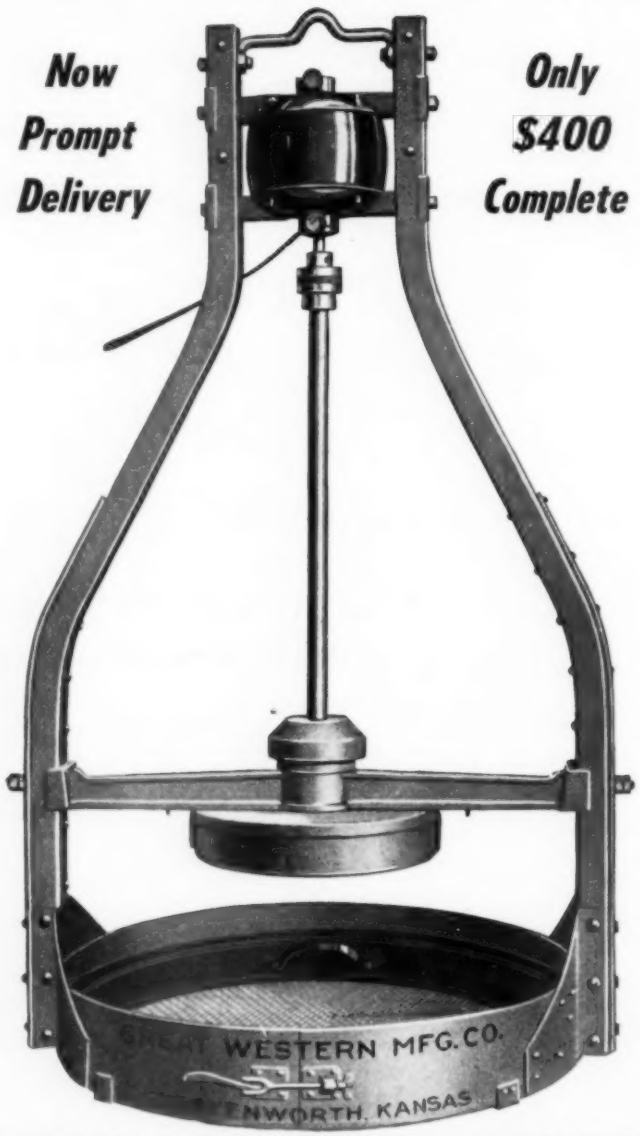

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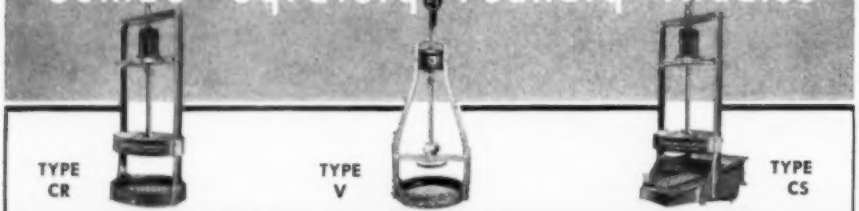


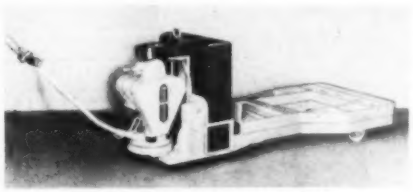
GREAT WESTERN MANUFACTURING CO.
LEAVENWORTH, KANSAS, U.S.A.

(*Continued from page* 230)

Unit is elevated from floor, providing a foot recess that prevents the cabinet from being marred by work shoes. Additional standard equipment includes a mechanism for removing chlorine and other tastes and odors, eliminating rust and sediment and completely conditioning the water. It also includes a 25-gal chilled water accumulator tank to meet periods of extra heavy demand.

For More Details Circle No. 18—Page 225

Truck: Moto-Truc Co., 1953 East 59th St., Cleveland — Motorized "walkie" truck is operated through chain and gear drive by two 12-v



motors connected in series. Open platform, which the company suggests as being suited to handling cores in foundries, is 36 in. wide at widest part, tapering down to 27-in., and is 60 in. long. Control of motion is accomplished by a turn on the roller type cross handle to provide two speeds forward and two speeds reverse. Push buttons in ends of handle put lifting and lowering of platform within finger tip reach. Its capacity of 10,000 lb is said to be the highest of any truck of its type.

For More Details Circle No. 19—Page 225

Goggle: American Optical Co., Southbridge, Mass.—Goggle is available with soft, pliable, nontoxic, Neoprene sponge rubber cushions as added protection against dust and fly-

ing particles. Cushions are designed to be slipped into place easily, with no need for stapling, sewing or cementing. Once in place they stay but can be replaced in a few seconds, it is claimed. Also available is a pouch-type plastic case to protect goggle from scratches, dust and dirt when not in use. When the goggle

(*Continued on page* 234)

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Originally developed to expedite the casting of motor blocks and heads, MILWAUKEE "Motor" Chaplets are now used extensively in producing light sectioned castings of all kinds. They are especially recommended for light castings which are to be subjected to gas, steam, oil or water pressure.

These light, double headed (square or round) Chaplets have the famous "MILWAUKEE Thread Stem" which permits the use of a *heavier stem* . . . resulting in the double benefit of a well secured core and a pressure tight casting. Scrap losses due to "leakers" are practically eliminated.

Milwaukee Motor Chaplets are available in plain, coppered or tinned finish; also in aluminum. Write for samples and prices, or refer to Page 9 of your Milwaukee Chaplet Catalog.

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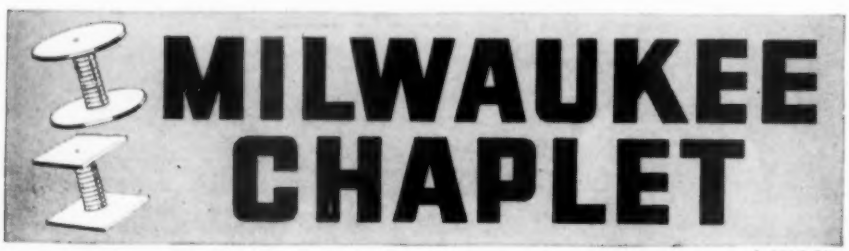

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(*Continued from page* 232)

is worn, the case may be tucked away in a worker's pocket.

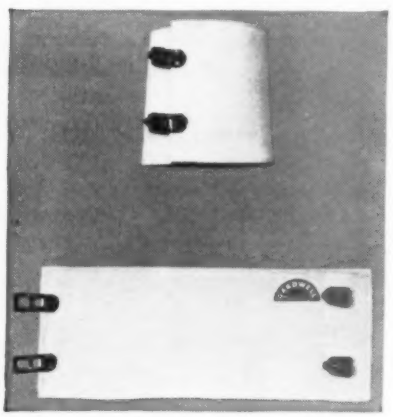
For More Details Circle No. 20—Page 225

Thermometer: Electric Paint & Varnish Remover Co., 1419 Morse Ave., Chicago 26—High temperature dial thermometer is said to be light in weight, well balanced and rugged. The sensitive end of the instrument

is enclosed in a stainless steel cylinder mounted at the end of a 30-in. steel tube leading to the dial head. Wood handle with eye hook for hanging the instrument completes the assembly. Dial scale numerals are 5/8-in. high, and instrument pointer travels 240 degrees on a 4-in. diam scale. Standard scale ranges provide maximum readings at 400 to 1500° F.

For More Details Circle No. 21—Page 225

Pants Guard: Safety Clothing & Equipment Co., 7016 Euclid Ave., Cleveland 3—Pants guard, designed for protecting workers from injury by getting their pants cuff caught in

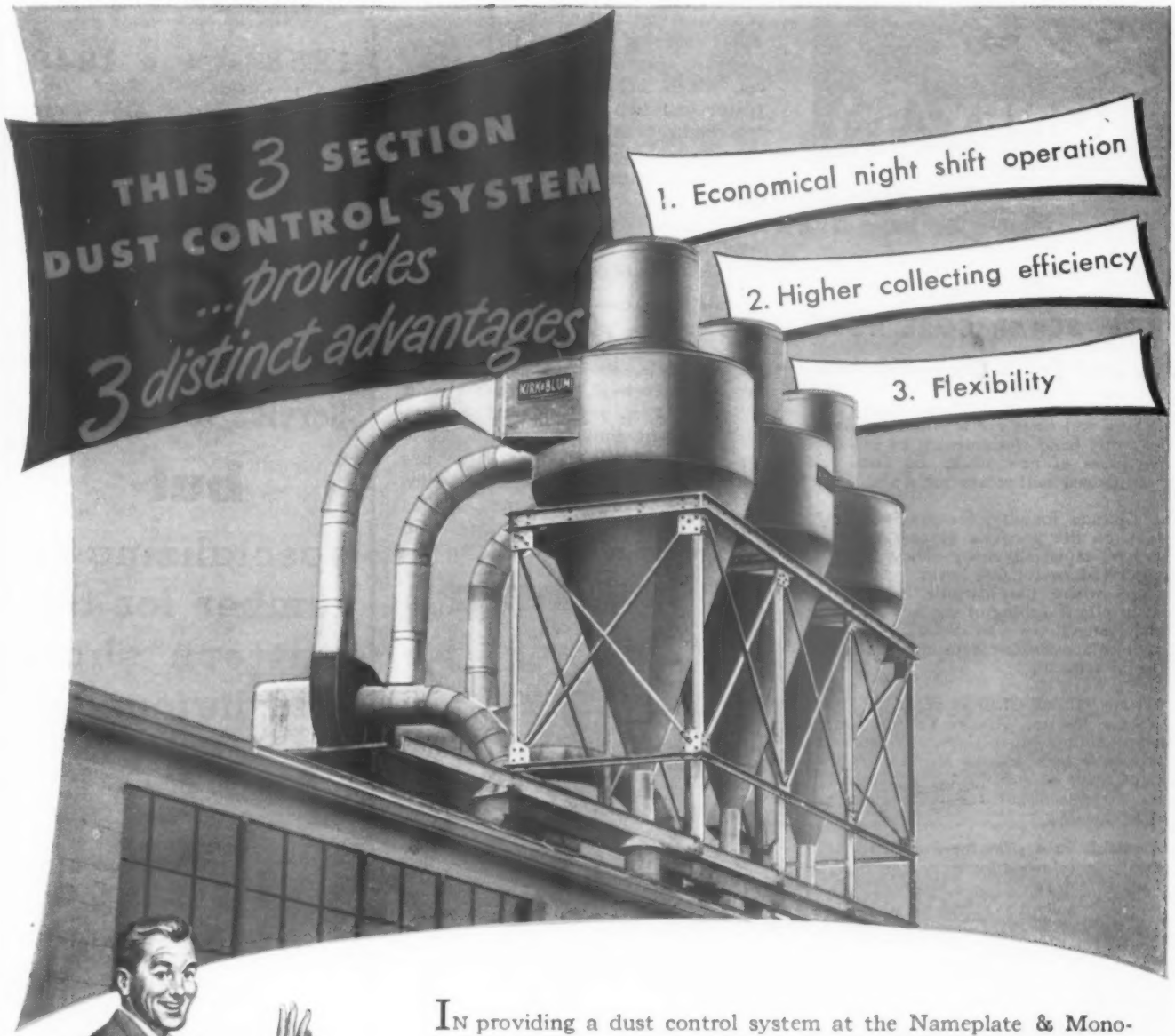


moving machinery or gears, is made from duck material and completely encloses the pants cuff. It extends 6 in. up on the ankle and is fitted with two buckles for adjustment and ease in putting on and taking off.

For More Details Circle No. 22—Page 225

Test Blocks: Clark Instrument Inc., 10200 Ford Rd., Dearborn, Mich. —Company has developed a series of precision test blocks covering hardness grades for all Rockwell scales and intended for use on Rockwell type hardness testers. In addi-

(*Continued on page* 236)



This installation in the buffing and polishing department of this well-known nameplate manufacturer illustrates the way in which KIRK & BLUM engineers are able to design, fabricate and install the equipment to meet your individual requirements.

IN providing a dust control system at the Nameplate & Monogram Company, Spencerville, Ohio, KIRK & BLUM Engineers designed a 3-system arrangement to accommodate special conditions within this particular plant. The results obtained in actual operation suggest that similar systems would be advantageous in many plants.

Dust control for 36 buffing and polishing machines was divided between the three systems. One of the systems serves the machines used on the night shift alone . . . thus avoiding the excessive cost of operating the complete system. In addition, multiple collectors provide higher collecting efficiency . . . the relocation of one line would not curtail the operation of the other two.

IF YOU are contemplating a new, enlarged or improved dust control system, write for free booklet, "Dust Collecting Systems in Metal Industries."

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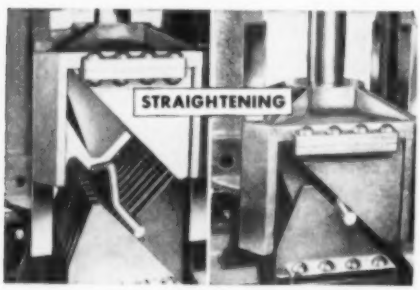
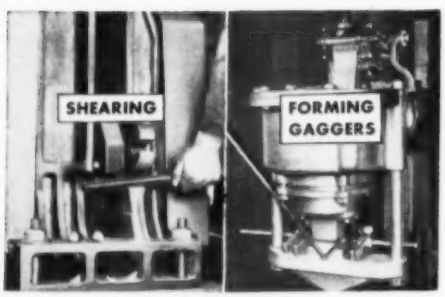
If core rod costs are a problem because of costly hand straightening or excessive purchases of new stock, the Core Rod Straightener will return you a nice profit.

A Chicago foundry, for example, saved 50% on the purchase of new materials and by replacing costly hand-straightening saved over 2,000 hours yearly. In shops where the machine is used the scrap pile is a thing of the past . . . labor and material costs go down . . . and the savings are sufficient to quickly return the investment.

No specialized talent is needed to operate the machine. Anyone can do it after a few simple instructions. It operates as fast as material can be fed into it. Rods can be cut to size quickly and accurately. An attachment for making gaggers is optional.

Available in 4 sizes for every need. *For complete information write for Bulletin 10-A.*





American CORE ROD STRAIGHTENER

AMERICAN WHEELABRATOR & EQUIPMENT CORP.
505 S. Byrkit St. Mishawaka 2, Indiana

(*Continued from page* 234)

tion to these standard test blocks, the company has developed a checking set, which includes a diamond penetrator and two test blocks—one for the higher and one for the lower range of hardness values. The diamond penetrator is intended for use only when checking the owner's machine, thus assuring accurate test readings. Set is furnished in an upholstered, leather-finished case.

For More Details Circle No. 23—Page 225

Overhead Conveyor: Jervis B. Webb Co., 8951 Alpine Ave., Detroit 4—Overhead conveyor for light jobs uses 2-in. pitch chain and travels on a 3-in. junior I-beam which is held by bolted brackets; these are attached either to supporting angles or tierods. The entire structure is light in weight and can be hung from the average plant ceiling. Chain is

drop forged of high strength steel with an ultimate strength of 8800 lb; conservatively recommended chain pull is 400 lb. The 2-in. pitch permits placing loads at intervals of 2 in. or more, depending upon the clearance required between the loads themselves. Trolley brackets are drop-forged of high carbon steel and wheels are equipped with antifriction ball bearings. The conveyor can be arranged to tie together operations of a whole plant, including several floors—carrying parts through fabrication, assembly, painting, plating, finishing, baking, heat treating, etc. Horizontal curves as short as 9-in. radius and small radius vertical bends are possible.

For More Details Circle No. 24—Page 225

Welding Machine: Air Reduction Sales Co., 60 East 42nd St., New York 17—Portable alternating current transformer arc welding machine has maximum output of 200 amp. The following features are claimed: Welding range is divided into two ranges of current adjustment with stepless control through-

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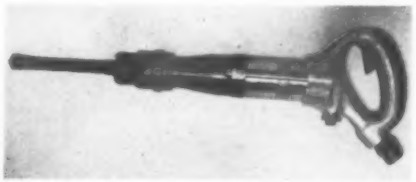
out each range. Capacitors are supplied in the secondary circuit to provide easy arc starting and arc stability. Built-in capacitors in the primary circuit provide power factor correction.

For More Details Circle No. 25—Page 225

Masonry Drill: Cleco Division, Reed Roller Bit Co., P. O. Box 2119, Houston 1, Tex.—Nine-pound masonry drill uses newly developed retainer



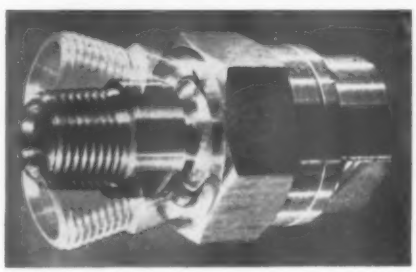
type star drills which fit directly into the drill to give a direct drive on the steel. The new feature is said to permit drilling holes up 1⅛-in. with the drill.

For More Details Circle No. 26—Page 225

Polishing Machines: Hammond Machinery Builders, 1637 Douglas Ave., Kalamazoo, Mich.—Four new single-spindle semiautomatic polishing and buffing machines are designed for use in conjunction with any lathe or contour machine. Two of the machines have single rotating spindles and two have rotating stroke type spindles. The machines are said to increase production over hand methods for polishing and buffing by as much as 650 per cent on pots, pans, plumbing fixtures and similar items.

For More Details Circle No. 27—Page 225

Swivel Joint Coupling: Kelite Products Inc., Box 2917, Terminal Annex, Los Angeles 54—Swivel ball joint coupling is designed to



turn 20 degrees in any direction with no restriction of flow regardless of angle. The coupling makes possible absorption of vibration and movement in all installations where pipe cannot be rigidly supported. Leakage and drip are said to be eliminated by the "O" ring principle, providing a positive seal against leakage at any pressure. The greater the pressure, the tighter the seal, yet free movement is maintained at

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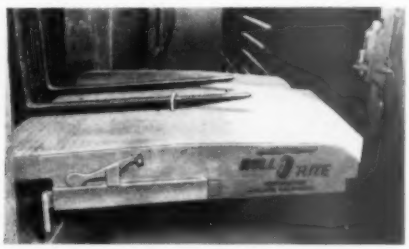
pressures far beyond normal requirements. The standard ⅜-in. swivel joint is claimed to be good for pressures from ¼-oz to 150 lb, and for temperatures up to 350° F. Models for any size pipe and for higher pressures and temperatures are available.

For More Details Circle No. 28—Page 225

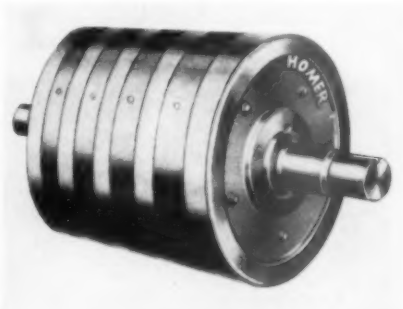
Bridge Ramp: Roll-Rite Corp., Eighth and Jefferson Sts., Oakland 7, Calif.—Bridge ramp is constructed with heavy longitudinal and trans-



verse trusses and specially designed car doorstops. Among the features claimed are: Full range positive locking device, precision beveled edges for easy entry, flared side rails for tire and equipment protection, industrial approved safety tread on the crowned surface, and counterbalanced lifting stirrup.

For More Details Circle No. 29—Page 225

Magnetic Pulleys: Homer Mfg. Co., Dept. 156, Lima, O.—Permanent magnetic pulleys are designed to be used as either head end pulleys or as idler pulleys in belt conveyor systems and are furnished in 57 standard sizes in diameters of 12, 15, 18, 20, 24 and 30 in. with belt widths ranging from 4 to 60 in. Pulleys are crowned to prevent belt



weaving and runout and to assist in equalizing the conveyed material as it passes over the pulleys. Head plates of the pulleys are cast aluminum, which is said to eliminate piling up of magnetic material on the outer edges of the pulleys, which are designed to preclude any loss of magnetic flux to the shaft to attract injurious metal particles to the bearing areas.

For More Details Circle No. 30—Page 225

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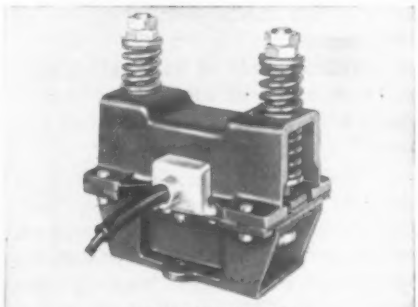

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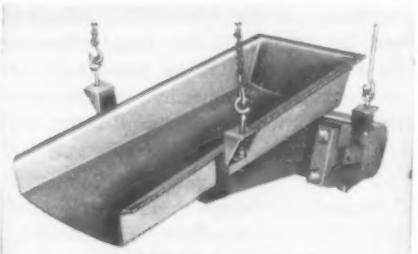

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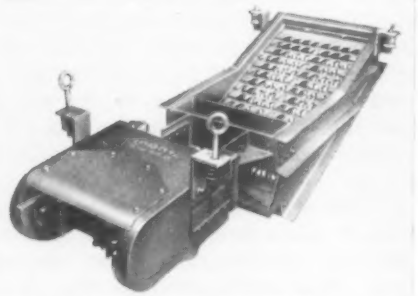

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WHITE CAST IRON

(*Continued from page* 85)

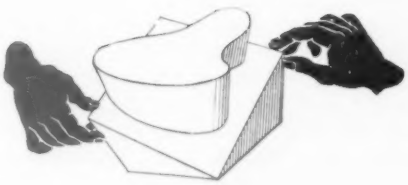
additions to control graphite nodule distribution and number. Since deoxidation has been shown to be a determinative factor affecting the number of graphite nodules developed, a method of nodule number control may become practicable through deoxidation. Of course, many other factors affect nodule number. Among these are rate of heating to the first stage graphitizing temperature, hydrogen content of the metal, various phases of the melting practice, and others. However, a deoxidation practice may become the most significant factor if the others are reasonably controlled.

4. The use of the deoxidizers to compensate for fluctuations in the oxygen content of the melt. This could conceivably simplify the problems presented by oxygen as a melting practice variable affecting the uniformity of response to annealing of the white iron. At present it appears that only small percentages of deoxidizers produce a considerable improvement in uniformity of annealing.

5. Utilization of lower silicon content white irons. Since more rapid annealing accompanies deoxidation of the white iron, a method of obtaining short-cycle irons exists without the necessity of carrying high silicon percentages. Distinct advantages, greater sub-zero temperature toughness, for example, can be obtained with low silicon irons. Applications of the type listed above appear to be a fertile field for applied research and development in the malleable iron foundries.

6. The use of small additions of deoxidizer to eliminate pinhole defects in castings where these are troublesome. This would be similar to the present practice in steel foundries where a few hundredths of a per cent aluminum are added to the steel to prevent or minimize pinholing.

Further consideration of the deoxidizing effects of some elements suggests a revaluation of what are considered to be the alloying effects of various elements on malleable irons. Conventionally, the elements present in malleable irons have been described as graphitizers or carbide stabilizers; as accelerators or retarders of graphitization. However, certain elements have been observed to function in both ways. For example, some handbooks classify boron as a strong re-



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tarder above 0.10 per cent and as a moderate graphitizer below 0.10 per cent. Titanium is listed as a graphitizing element despits the fact it is known to be a strong carbide forming element in steels. These apparently anomalous behaviors are reconciled by considering the deoxidizing possibilities of the element in question.

To obtain a fundamental viewpoint of deoxidation thermodynamic calculations were employed. Table III reveals the relative deoxidizing power of some elements at 1600°C (2912° F) in molten iron in contact with a slag composed of the pure oxide of the element. The calculated values listed are based on the assumption that molten iron, the oxygen in the iron, the per cent of residual element in the iron, and the oxide of the element are in equilibrium at 1600° C (2912° F). It was also assumed that the equilibrium constants are valid and only one oxide is formed, SiO_2 for example, as a result of the reaction with each deoxiding element. The latter assumptions are not necessarily true, as was pointed out in the case of silicon. It is also true that the calculations are not concerned with an iron containing carbon, manganese, phosphorus, and sulphur, other elements or non-equilibrium conditions, so that they are not to be construed as applying quantitatively to white cast irons. Nevertheless, the thermodynamic approach serves as a sound basis for pointing out some of the fundamental features of deoxidation.

A critical study of Table III brings out a number of interesting points. These are discussed separately as follows:

1. The elements are tabulated in order of increasing deoxidizing power. (Boron was calculated between the limits of its activity as postulated by Gurry[7] since more limiting data were not available to the author.)

2. To lower the oxygen content to any given level, a certain residual percentage of the deoxidizing element must be present in the iron. The residual percentage is an indication of the deoxidizing potency of the element; the lower the residual required, the more effective the deoxidizer.

3. When the residual percentage of deoxidizing element is sufficiently high after deoxidation, an alloying effect of the element is obtained. The alloying effects of the element may completely overshadow the effects produced by deoxidation. Silicon is the familiar example in white cast irons and its alloying effects are quite well understood in the malleablizing process. Another example of this behavior is chromium, which exerts resistance to graphitization.

4. If deoxidation is attained with a very low or negligible residual percentage of deoxidizing element, the initial effect of the element is reaction with the available oxygen in the melt. It is only when deoxidation approaches completion that the element can function as an alloying element. Aluminum and zirconium provide examples of this type of behavior.

5. Elements of intermediate deoxidizing effect can exert both a deoxidizing and alloying action simultaneously. This happens because deoxidation requires sufficient residual element in the iron so that alloying occurs as deoxidation progresses and the total effect is dependent on which is the more potent. The data presented for titanium demonstrate this behavior very well. Boron possibly may function in this way also. In fact, this may be the reason that the use of excessive boron additions have been reported to lower the physical properties of malleable irons.

6. The deoxidizing characteristics

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of an element should not be evaluated solely on the basis of the percentage by weight required to obtain a particular deoxidizing effect. From Table III it might be concluded that boron is the most effective deoxidizer since the smallest weight percentage is required. However, this is not true, since deoxidation with boron requires a greater residual percentage in the iron than does either zirconium or aluminum. The actual weight percentage required is related to the atomic weight of the element and its combining capacity with oxygen as well as its deoxidizing power as shown by the calculated values.

7. The particular effects of some elements in malleable irons are dependent on whether the element is functioning primarily as a deoxidizer, as an alloying element, or at some intermediate stage between the two extremes. This condition probably accounts for boron and titanium being considered both as retarders and accelerators of graphitization. Future classifications of the effects of various elements on the graphitization process should consider this viewpoint.

After reviewing the foregoing points, it appears that each of the elements in Table III has certain inherent advantages and limitations; i.e., those not associated with variables of the foundry practice. For straight forward deoxidation, aluminum and zirconium appear to be most effective; particularly for standard malleable iron. If an alloying effect were desired as in some pearlitic malleable irons, manganese, titanium, boron, vanadium or combinations might be more useful. Other deoxidizers remain to be considered.

It is stimulating to note that the viewpoints enumerated above are rational with fundamental metallurgical principles, are already well established in other fields of ferrous metallurgy and require no anomalous or complex explanations.

Interpretation Applied to Melting—Interesting interpretations of the special features of some well known malleable iron melting practices are suggested when oxygen or the forms in which it exists in white irons is considered as promoting resistance to graphitization. These in relation to particular melting operations are considered as follows:

A. Cupola Melting

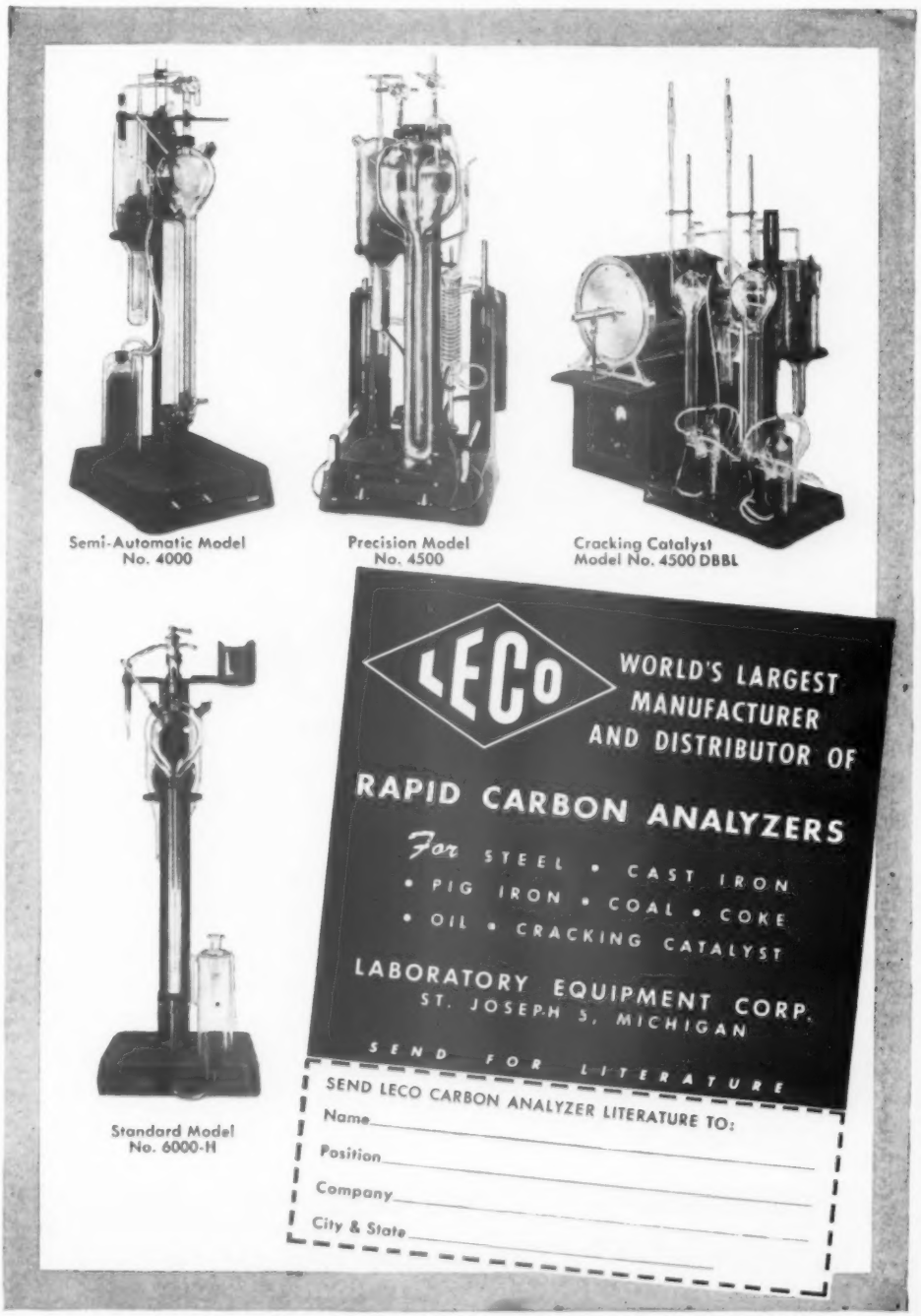
1. Use of humidity control on the cupola blast.

The arguments for humidity control of the blast are very well stated in a paper by Morrison[5] (referring to cupola melting of white cast iron):

"In addition to the bad effects on the carbon control of the iron, humidity has a very pronounced effect on the mottling tendency of the iron. All other things being equal, the iron made with low humidity blast will mottle much more readily than iron made with high humidity blast.

"The ability of the iron to anneal is also affected to a marked degree by the moisture in the blast. High moisture in the blast produces an iron that anneals with more difficulty than iron of the same composition made with blast that is low in moisture content."

The added difficulty of annealing iron melted with a high humidity blast in the cupola has often been related to hydrogen in the metal. However, any hydrogen in the metal from the humidity source is only obtained by causing an equivalent amount of oxygen to be available to the iron. From other research work it may be shown that oxygen in the iron from blast humidity may be more potent in promoting the resistance to annealing referred to by Mor-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2. The elimination of rusty materials in the cupola charge.

Again the reasons for avoiding rust in the charge are excellently pointed out by Morrison[5]:

"Rusty charge material is avoided as much as possible. This type of stock fluxes the cupola lining and slag blocks badly, contributes to irregular silicon and manganese analysis, and leads to large melting losses. Moreover, iron made with rusty material shrinks, misruns and cracks abnormally, and anneals with difficulty. Sprues poured from an iron made with high iron oxide content in the charge will not mottle very easily even with very soft iron."

That oxygen may carry through the melting operations and ultimately function to resist graphitization seems definitely indicated.

B. Cupola—Electric Furnace Duplexing

1. The Process

Holding at high temperatures in the electric furnace is employed to prevent mottling in relatively high silicon content irons of the so-called short cycle type. Such an operation is favorable for maintaining or introducing a high oxygen content as dissolved SiO, CO, or others. An interesting comment by Morrison[5] is related to this point:

"The electric furnace doors are kept open at all times, as we have found that if the furnaces are run with the doors closed, the iron mottles with ease. This phenomenon is not clearly understood. We can only say that it has been our experience that any condition that tends to deoxidize the metal promotes the formation of primary graphite, and any condition that oxidizes the metal acts in the opposite direction. Operating with the doors closed, the furnace atmosphere is less oxidizing than with the doors open."

The higher silicon results in primary graphitization when the iron is deoxidized. However, lower silicon content irons may be used when deoxidation is practiced to overcome the danger of primary graphitization.

C. Cupola—Air Furnace Duplexing.

1. The Process

The use of high temperatures and the furnace holding period permits an oxygen equilibrium to be approached in the metal. There is a direct analogy to the practice of minimizing oxygen fluctuations by controlling the humidity of the cupola blast in the electric furnace duplexing process.

2. Boron ladle additions.

The practice of adding boron to the ladle is said to be for the purpose of counteracting the stabilizing effects residual chromium. The amounts added are dependent on the percentage of chromium and usually consist of about 0.001 per cent boron for each 0.03 per cent residual chromium. However, some foundries use the boron treatment even when no residual chromium is present. The viewpoint that the desirable effects of boron in small amounts are primarily due to its deoxidizing action has been previously stated.

D. Effect of FeO content of the melting furnace slag.

Some furnace operators and metallurgists have contended that high FeO percentages in the slag result in increased resistance to annealing. An outstanding example of this effect has been described by Vennerholm and Bogart[6]. These authors reported that the number of castings not properly malleablized was very low when the electric furnace slag contained less than 18 per cent FeO. On the other hand, when the electric furnace slag contained more than 25 per cent FeO practically 100 per cent

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of the castings did not respond to the normal malleablizing treatment and required recycling. This is a further example of the effects of oxidizing conditions in the melting practice.

A number of other practices that seem to be related to the oxygen which may be present in the iron could be cited. Obviously, the point should not be over-emphasized. Nevertheless, reflection on the preceding discussions definitely points out that oxygen is a variable in malleable iron melting processes which is worthy of precise engineering control. Metallurgical regulation of this variable may be achieved in a number of different ways, as attested by the melting practices adopted by the industry. That melting processes and equipment aimed at controlling this factor should have been empirically developed by practical foundrymen is not a coincidence. Certainly the foundry practice and the metallurgical theory must be ultimately in agreement if they spring from the same scientific fundamentals.

Bibliography

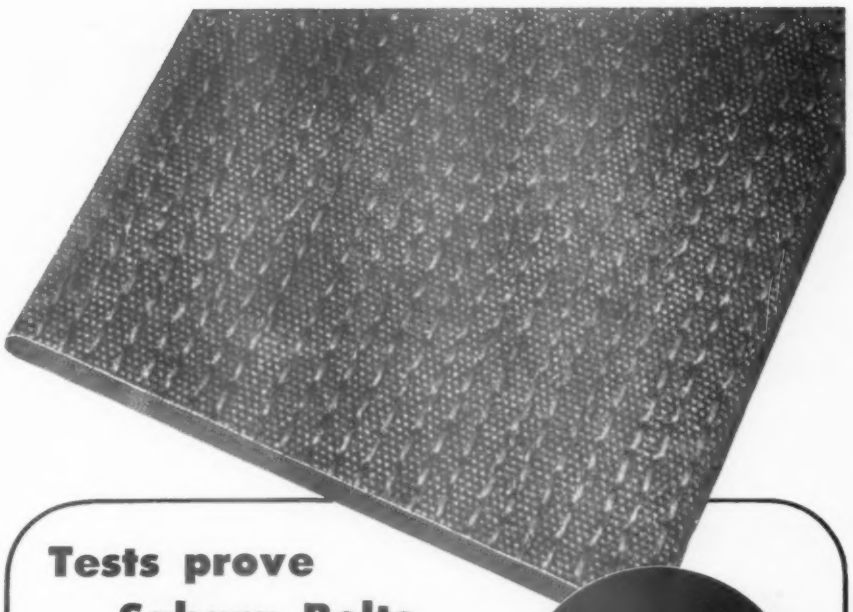
9. "Cupola—Electric Furnace Duplexing of Malleable Iron." C. Morrison; Symposium on Malleable Iron Melting Preprint 43-37, American Foundrymen's Society.
10. "Effect of Slag Types on Heat Treatment of Malleable Iron." G. Vennerholm and H. N. Bogart. *American Foundryman*, April 1949, p. 96, Vol. 15, No. 4.

New Refractories Laboratory

General Refractories Co., Philadelphia, has begun operations at its new research and development laboratory, recently opened at Baltimore. The new research center has complete chemical and physical facilities for studying refractories in all stages from the raw material, through manufacturing processes, to final use in furnace operation.

An experimental pilot plant is also included in the setup whereby all manufacturing processes may be performed on full commercial scale but under strict control of laboratory procedure. A large testing division is available for evaluating the qualities of the pilot plant products.

Included among the laboratory's principal current objectives are the development of the all-basic open-hearth furnace and necessary auxiliary processes, whereby it is expected production of open-hearth steel will be increased up to 30 per cent. Some phases of this project have already passed the pilot plant stage with outstanding results. Other phases, still in the development stage, will be speeded up by availability of the new research facilities.



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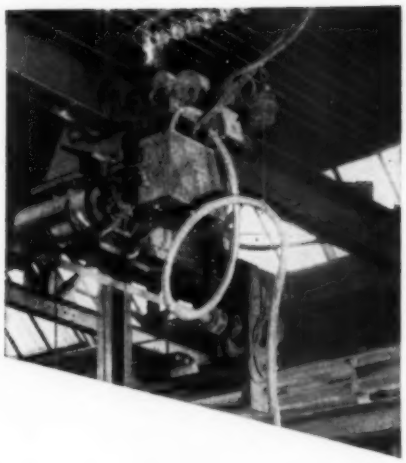

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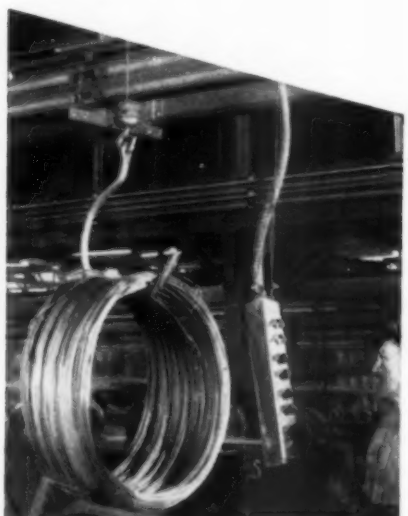

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REFRACTORY PRACTICE

(*Continued from page* 83)

(Figs. 8, 9 and 10). The insulating refractory castable is supported by a suitable combination and spacing of refractory and alloy anchors supported by 1¼-in. pipe attached to the steel structure of the oven. The refractory insulating castable is sectionalized using broken joints. Proper provision for expansion is provided for by suitable expansion joints at all joining surfaces. Provision for movement in any horizontal plane is provided by the type and design of anchors used.

In Fig. 8 the steel work and anchor support castings have been erected to receive the anchors. The complete anchor arrangement is shown in Fig. 9. All refractory and metallic anchors are installed and form has been placed to receive the refractory castable. In Fig. 10 a panel has been poured and is ready for the application of additional insulation.

Walls and Arch Built Alike

Still a further development has been accomplished in the construction of a unit in another plant in which the entire furnace structure —that is, side walls as well as arch —was built of insulating refractory castable and insulation. This unit is steel enclosed, and insulating refractory castable in side walls as well as arch is provided with anchorage designed to allow movement parallel to the wall surfaces.

This unit is illustrated in Fig. 13. Note particularly the construction details of the flat monolithic insulating refractory castable arch, and also the monolithic side walls in which joints are eliminated. Construction details are shown in the typical drawings (Figs. 4 and 5). The method of placement of side walls is shown in Figs. 6 and 7.

All of this discussion has covered details of construction. It has been shown that many refractory and insulating materials have been employed in these installations. Some of the physical properties and specifications of these materials should be noted. Insulating firebrick have been used in side walls and arch in several of these units. For the most part 2300° and 2600° insulating firebrick have been employed.

Insulating firebrick of this type are classified as Group 23 and Group 26

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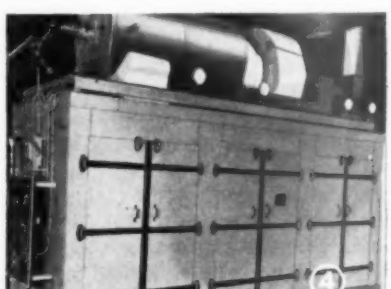

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in the Standard Classification of Insulating Firebrick (American Society of Testing Materials Designation C-155-47). This designation specifies a reheat change of not more than 2 per cent when tested at 2250° F and 2500° F, respectively, and a bulk density not in excess of 48 and 52 lb per cu ft, respectively.

Refractory castable of the type desired is covered under Tentative Specification (ASTM Designation C-213-47T) for Class 27 which requires a reheat change, not more than plus or minus 1.5 per cent after heating at 2550° F and a modulus of rupture not less than 100 lb per sq in. after drying at 220 to 230° F, and also after firing to 2000° F. No standard tests have as yet been specified by ASTM for insulating refractory castables.

Forms Tin Research Institute

John Ireland, director, Tin Research Institute, London, has announced formation of Tin Research Institute Inc., an American corporation devoted to providing free technical services to consumers of tin in United States. Office of the new corporation, at 492 West Sixth Ave., Columbus, O., will handle inquiries or requests for technical service, and a sponsorship will be maintained at Battelle Memorial Institute to handle new researches. Robert J. Nekervis has been appointed supervisor of metallurgical development and Robert M. MacIntosh, supervisor of chemical development. Both have been associated with Battelle Memorial Institute for the past 8 years. Trustees of the new organization are Clarence D. Laylin, Dean Charles E. MacQuigg, and Dr. Bruce W. Gonser, all of Columbus, O.

Gray Iron Founders Form Utah Group

Gray iron management executives representing foundries in Provo, Ogden and Salt Lake City recently established a management group in Utah, at a meeting recently held in Salt Lake City. Jack F. May, Lundin & May Foundry Co., Salt Lake City, was elected chairman and Jack N. Carter, American Foundry & Machine Co., Salt Lake City, was made secretary. Raymond L. Collier, executive vice president of the society, addressed the group and described aims and activities of the association. He also brought the group up-to-date on developments of the so-called nodular gray iron.

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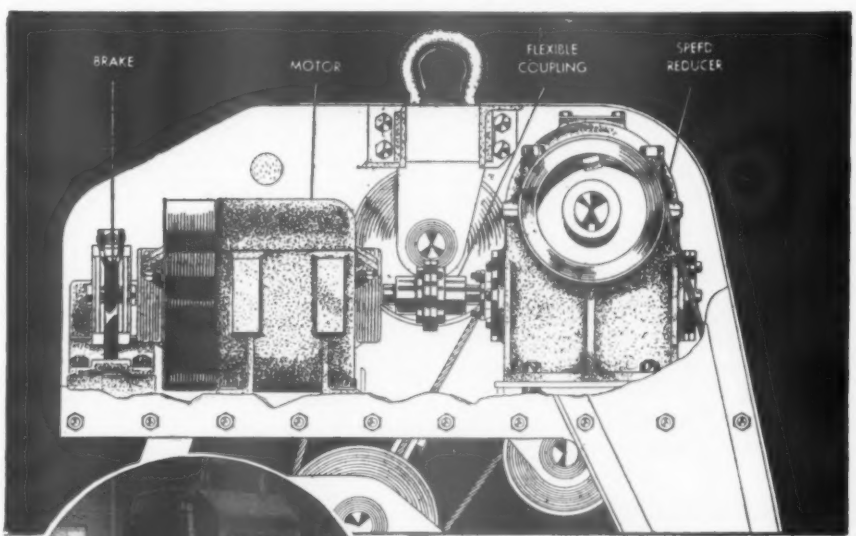

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MOTOR PROTECTION: Allis-Chalmers Mfg. Co., 1032 South 70th St., Milwaukee—Bulletin 51B-6210-B describes design and construction feature of safety-circle motor with heavy cast iron frame which completely surrounds all working parts. Other improvements of the safety-circle protection include double insulated stator, die-cast rotor, efficient ventilation, drip-proof end brackets, pre-lubricated bearings, precision machined feet and roomy conduit box. Drip-proof and splash-proof motors are available in sizes from 1 hp at 1800 rpm to 20 hp at 3600 rpm, in frames 326 and smaller.

For More Details Circle No. 90—Page 225

WELDING INFORMATION: Eutectic Welding Alloys Corp., 40 Worth St., New York 13—Bi-monthly bulletin for welding engineers, with articles in case history manner on typical and difficult problems of repair and construction, with photographs and full data, in fields of steel, cast iron, hard overlay, aluminum, etc. Attention is directed toward recommending the particular low temperature welding rod for each job and solving the more difficult metal joining problems of repair and construction.

For More Details Circle No. 91—Page 225

LABORATORY APPARATUS: Precision Scientific Co., 3737 West Cortland St., Chicago 47—Catalog 86-ONR describes the company's line of laboratory apparatus and accessories for preparation of metallographic specimens. Included in the descriptions and illustrations are automatic polishers, submerged specimen cutters, semi-automatic specimen mounting press, hand-operated mounting presses and polishers, with accessories.

For More Details Circle No. 92—Page 225

ETHYL SILICATES: Carbide & Carbon Chemicals Corp., Unit of Union Carbide & Carbon Corp., 30 East 42nd St., New York 17—Bulletin F-7250 describes recent advances in controlling gelation of ethyl silicate during preparation of investments for precision casting. Specifications, methods of hydrolysis, applications, gelling and bonding agents, use as a mold binder are discussed and preparation of investments is described.

For More Details Circle No. 93—Page 225

HOSE CLAMPS: Hose Accessories Co., Lehigh Ave. & Seventeenth St., Philadelphia 32—Bulletin 125 describes hose clamps to fit every type and size of industrial and construction hose. More than 160 different sizes and types are shown, including universal type clamps, single and double bolt clamps for shank type couplings, interlocking type high pressure clamps in sizes up to 4 in. oversize, double bolt hose clamps and band type hose clamps.

For More Details Circle No. 94—Page 225

INVESTMENT CASTING: Federated Metals Division, American Smelting & Refining Co., 120 Broadway, New York 5—"Foundry Metals Digest Vol. III, No. 1," describes adapting of the lost-wax process to modern industrial use. A brief account is given of the application of investment casting in production of small, intricate castings. Folder also gives some informative facts about aluminum.

For More Details Circle No. 95—Page 225

CONTROLLERS: Wheelco Instruments Co., 847 West Harrison St., Chicago 7—Bulletin MC-1 presents information on a new multi-switch indicating pyrometer controller. Suggested applications, measuring and indicating features, control functions, scale ranges and technical data are covered. Complete specifications and prices are furnished for both direct deflection and resistance thermometer models.

For More Details Circle No. 96—Page 225

RADIAL SAW: Walker-Turner Division of Kearney & Trecker Corp., 639 South Ave., Plainfield, N. J.—Folder 1009 on the company's center pivot radial saw for wood, plastic and metal includes action and feature photos, model listing, accessories and prices. Also shown are standard components which are available for setting up high-speed production line cutting.

For More Details Circle No. 97—Page 225

DATA SHEET: Apex Non-Ferrous Foundry, 7424 Bessemer Ave., Cleveland 4—July issue of Apex Data Sheet initiates a series to be published monthly, presenting information on aluminum, bronze and brass castings, equipment, personnel and experience. Illustrations of various types of specialized services are shown and described.

For More Details Circle No. 98—Page 225

BLOWERS: Lamson Corp., Allen Billmyre Division, 425 Lamson St., Syracuse 1, N. Y.—Bulletin B-5-A covers centrifugal type blowers and exhausters for handling air and gases of various densities, temperatures and chemical composition. Capacities and general specifications for the various models are listed.

For More Details Circle No. 99—Page 225

INDUCTION MOTORS: Electric Machinery Mfg. Co., 1331 Tyler St., Minneapolis 13—Synchronizer No. 28, the company's publication, covers in four parts the basic theory, opera-

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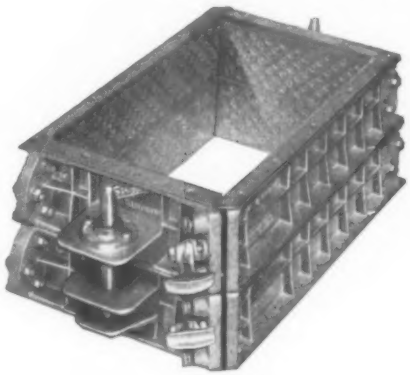

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tion, characteristics and applications, and control of large induction motors. Illustrated with photographs and cut-away views, the booklet has nearly 50 graphs with explanatory figures accompanying the text, and presents a comprehensive, practical treatment of squirrel-cage and wound rotor motors.

For More Details Circle No. 100—Page 225

CENTRIFUGAL CASTING: Cooper Alloy Foundry Co., Bloy St. & Ramsey Ave., Hillside, N. J.—Folder describes casting stainless steel centrifugally in permanent metal molds. Developed to produce on a mass production basis high alloy castings required for jet engine rings, the process may be adapted to industrial applications such as pump liners, seat rings and other cylindrical shapes.

For More Details Circle No. 101—Page 225

MASONRY REPAIR: Stonhard Co., Dept. TF, 1306 Spring Garden St., Philadelphia 23—Folder gives complete information on stoppage of leaks, from actual breaks to hair-crack water seepage in all types of above and below ground masonry construction. Repair material is especially recommended for basements, foundations, pits, dams, reservoirs, etc.

For More Details Circle No. 102—Page 225

PALLETS: National Pallet Corp., Oliver Bldg., Pittsburgh 22—Illustrated catalog, "National Pallets," describes many types of wooden pallets including standard, reversible, utility, cargo, utility box, skid type and collapsible rack models. Normal load limits are shown together with specific uses for each type.

For More Details Circle No. 103—Page 225

TRACTOR SHOVEL: Frank G. Hough Co., 703A Sunnyside Ave., Libertyville, Ill.—Broadside pictures and describes a 4-wheel drive tractor shovel. Action views show some of its digging, loading, grading and carrying uses. Specifications and design details are listed.

For More Details Circle No. 104—Page 225

SAND CONDITIONER: Beardsley & Piper, Division of Pettibone Mulliken Corp., 2424 North Cicero Ave., Chicago 39—Booklet describes and illustrates a machine designed to condition molding sand. Drawings and a table of complete specifications are included.

For More Details Circle No. 105—Page 225

HYDRAULIC FLUID: Monsanto Chemical Co., 1724 South Second St., St. Louis 4—Bulletin describes a hydraulic fluid for metal die casting systems, which is said to be nonflammable, noncorrosive and economical.

For More Details Circle No. 106—Page 225

REFRACTORY: Walsh Refractories Corp., Dept. P-2, 4070 North First St., St. Louis 7—Brochure describes a plastic monolithic refractory for furnace linings.

For More Details Circle No. 107—Page 225

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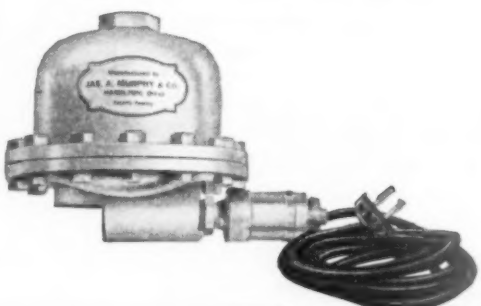

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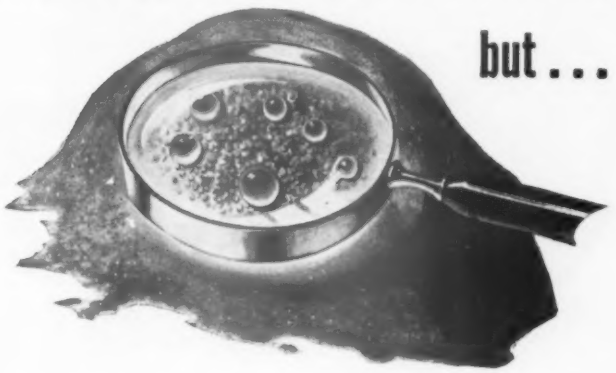

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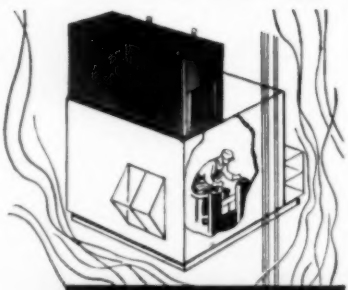

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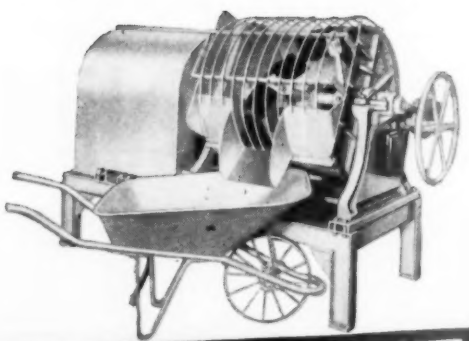

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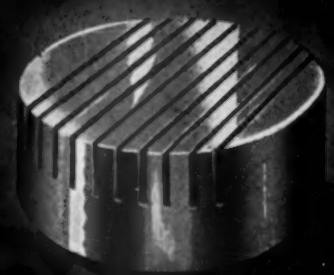

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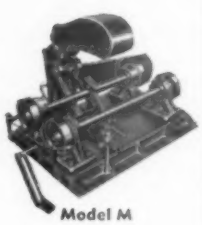
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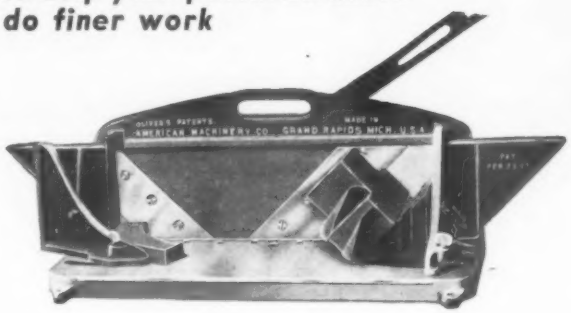

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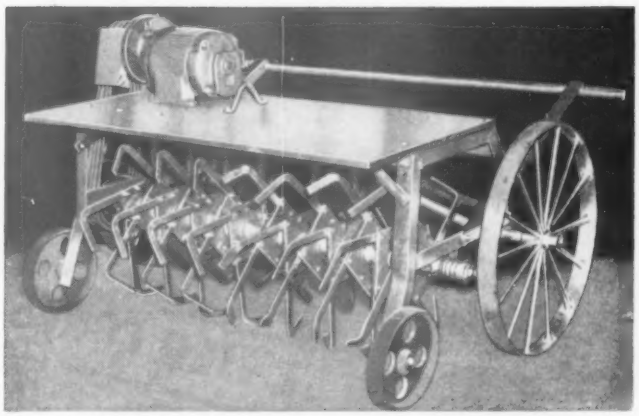

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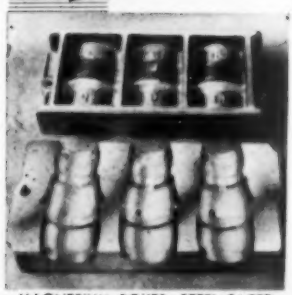

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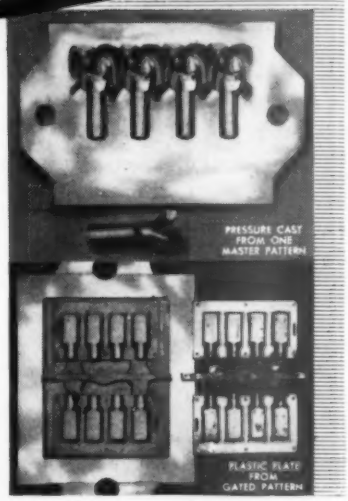

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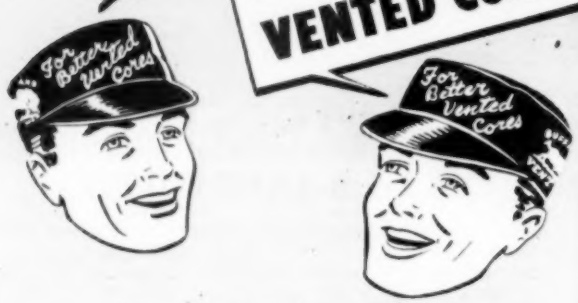

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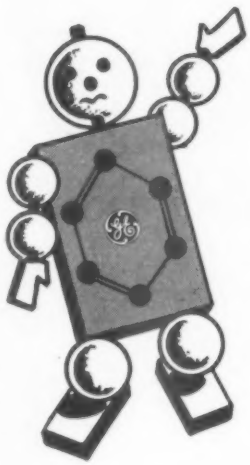
REDUCE *baking* TIME

WITH G. E.'S *NEW* LIQUID RESIN CORE BINDER



Now you can cut the curing time for cores by about one-half—thanks to General Electric's new liquid resin core binder—G-E #12300. For this quick-baking phenolic binder requires only about 50% of the curing period required by conventional oil binders.

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Besides a reduction in baking time, G-E 12300 gives you, compared with conventional oil binders:

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2. FEWER CASTING REJECTS: gives exceptionally good permeability and low gas evolution to cores during casting.

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FIND OUT what G-E 12300 can do for you. Write for free samples and technical data to Section 44-9, Chemical Department, General Electric Company, Pittsfield, Mass.

You can put your confidence in-

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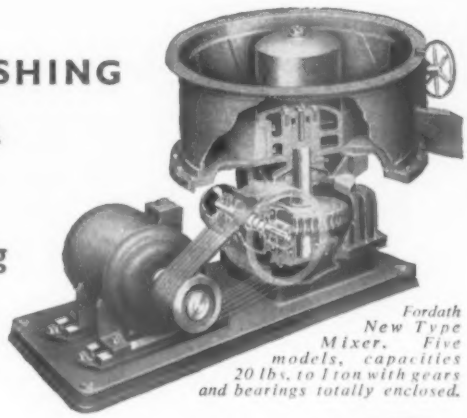
NO CRUSHING ANSWER to the sand-mixing question



Fordath New Type Mixer. Five models, capacities 20 lbs. to 1 ton with gears and bearings totally enclosed.

Makers of the famous GLYSO

TO MAKE an oil-sand mix for core work do not crush the sand, do not cause the grains merely to chase each other around the pan. Instead, fold and *rub* the sand and binding compound in a lively tumble so that each grain of sand is coated with a film of binder; so that capillary action can draw the oily GLYSO or EXOL to the areas of contact between all the grains throughout the batch of sand. Put your oil and sand into the swift, silent, efficient FORDATH NEW-TYPE MIXER wherein, between the rotating, curved blades and the fixed inclined ribs on the inner walls, a thorough, properly aerated charge of oil-sand is prepared; to be cleanly discharged after 2 to 3 minutes mixing.

NEW TYPE MIXER

FORDATH IN THE FOUNDRY

Full details from

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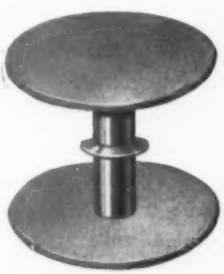
Buffalo *"LEEK-PRUF"* CHAPLETS



In both Double (shown) and Single Head types of "Buffalo" *LEEK-PRUF* Chaplets, the chief factor of efficiency is the exclusive fin design.

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CATALOG NO. 15

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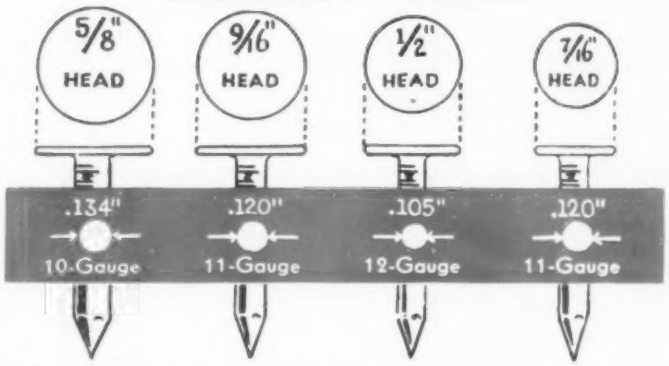

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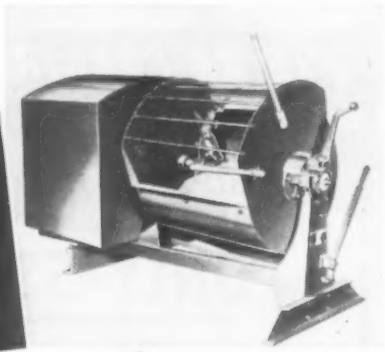

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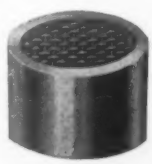

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1935— First purchase of radium for industrial radiography by Westinghouse; bought from Radium Chemical Co., Inc.

1938— AFA questionnaire revealed that 8% of steel casting men used radium radiography.

1941— 22% of steel casting men bought, rented, leased or employed radium for radiographic purposes.

1946— 150 steel foundries rented or leased radium.

1948— 200 steel foundries rented or leased radium.

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SIMPLICITY OF OPERATION
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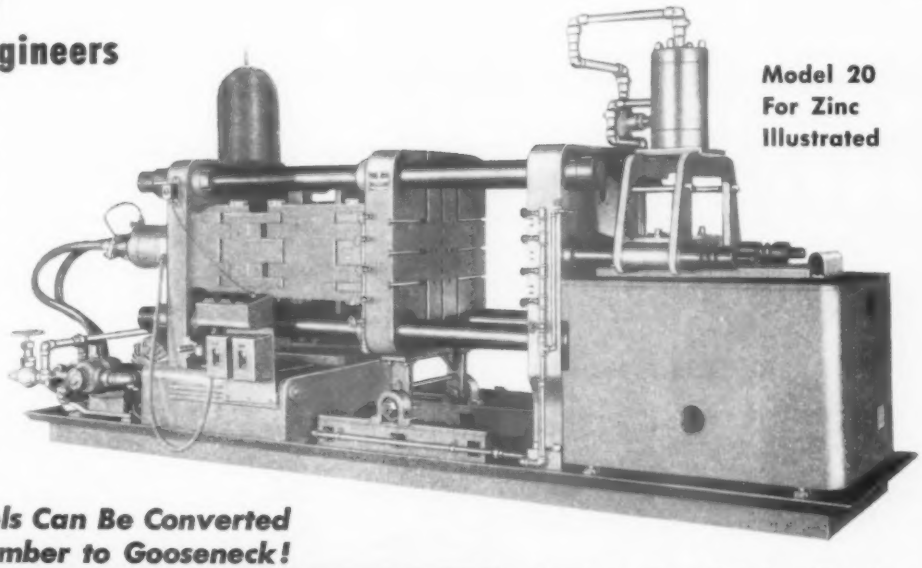

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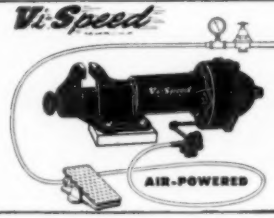

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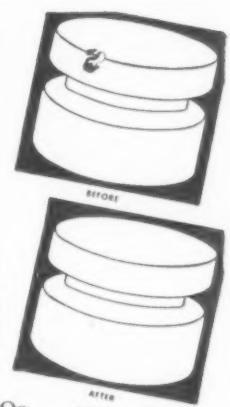

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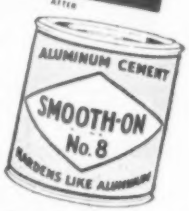

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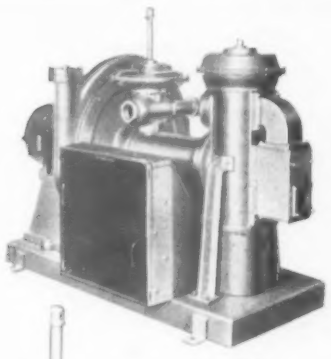

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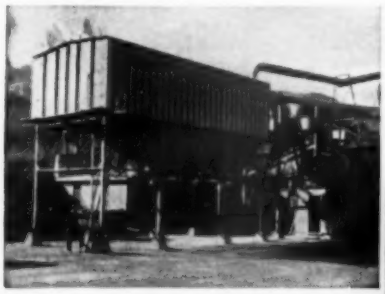

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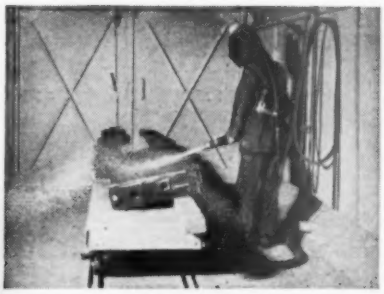

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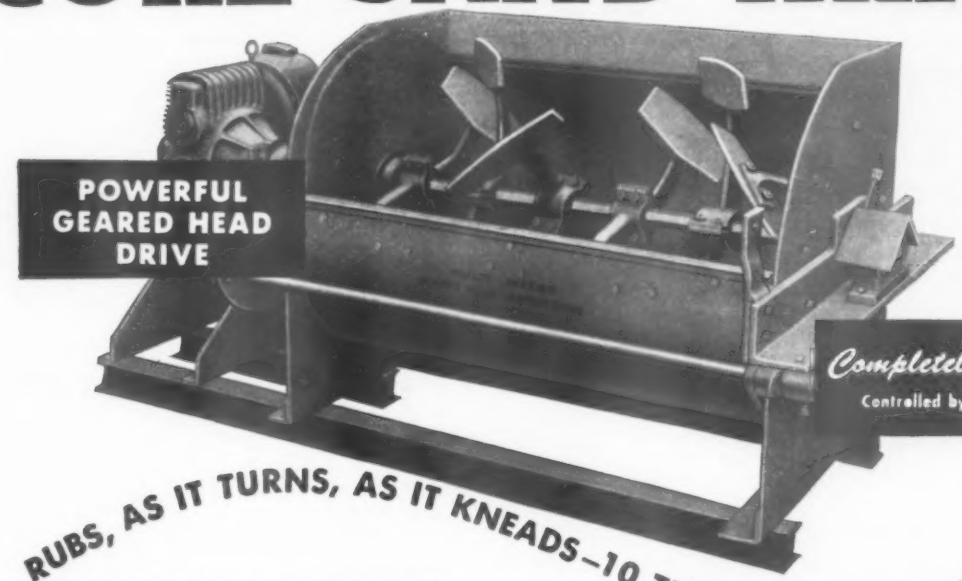

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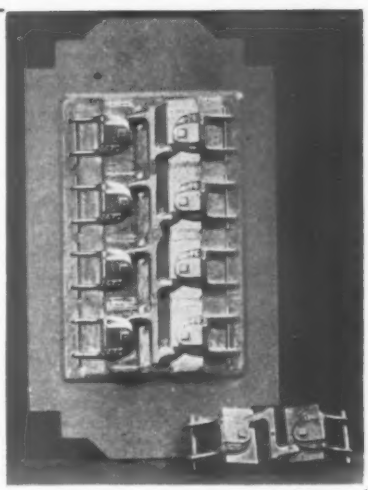

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American Gum Products Co., 500 Fifth Ave., New York 18, N. Y.
Bakelite Corp., 300 Madison Ave. New York 17, N. Y.
Cities Service Oil Co., 3200 S. Western Ave., Chicago 8, Ill.
Corn Products Sales Co., 17 Battery Pl., New York 4, N.Y.
Dayton Oil Co., Dayton 1, Ohio.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
General Electric Co., Pittsfield, Mass.
Hercules Powder Co., Wilmington 99, Del.
E. F. Houghton Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.
Chas. A. Krause Milling Co., 404 E. State St., Milwaukee 1, Wis.
National Starch Products Inc., 270 Madison Ave., New York 16, N.Y.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia 24, Pa.

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Robeson Process Co., 500 Fifth Ave., New York 18, N. Y.
Superior Flake Graphite Co. 33 So. Clark St., Chicago 3, Ill.
Werner G. Smith Co., 2191 W. 110th St., Cleveland 2, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.
United Oil Mfg. Co., 1429 Walnut St., Erie, Pa.
Velsicol Corp., 330 E. Grand Ave., Chicago 11, Ill.

CORE BLOWER BUSHINGS

Martin Engineering Co., Kewanee, Ill.

CORE BLOWING MACHINES

Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Wm. Demmler & Bros., Kewanee, Ill.
Federal Foundry Supply Co. 4600 E. 71st St., Cleveland 5, O.
Foundry Service Co., Birmingham, Ala.
Harrison Machine Co., 2725 Station Rd., Wesleyville, Pa.
International Molding Machine Co., LaGrange Park, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.
The Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

CORE BOXES

Accurate Match Plate Co., 1847 W. Carroll St., Chicago, Ill.
Harrison Machine Co., 2725 Station Rd., Wesleyville, Pa.
Industrial Pattern Works, 2621 Belmont Ave., Chicago 18, Ill.
Master Pattern Co., 1315 Main Ave., Cleveland, Ohio.
Plastic Corp. of Chicago, 2444 So. Central Ave., Cicero 50, Ill.

CORE COMPOUND

Bakelite Corp., 300 Madison Ave. New York 17, N. Y.
Cities Service Oil Co., 3200 S. Western Ave., Chicago 8, Ill.
Dayton Oil Co., Dayton 1, Ohio.
Delta Oil Products Co., Milwaukee 9, Wis.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Fordath Engineering Co. Ltd., West Bromwich, Birmingham, England
Werner G. Smith Co., 2191 W. 110th St., Cleveland 2, O.
Frederic B. Stevens, Inc., Detroit 16, Mich.
Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.
Velsicol Corp., 330 E. Grand Ave., Chicago 11, Ill.

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Freeman Supply Co., Toledo 5, O.
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Fordath Engineering Co. Ltd., West Bromwich, Birmingham, England
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Milwaukee Foundry Equipment Co., 3228 W. Pierce St., Milwaukee 4, Wis.
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The Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
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Kirk & Blum Mfg. Co., Cincinnati 25, O.
Lanly Company, 750 Prospect Ave., Cleveland 15, O.
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Frederic B. Stevens, Inc., 18th St. & Vernor Highway, Detroit 16, Mich.

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Corn Products Sales Co., 17 Battery Pl., New York City 4.
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Federal Foundry Supply Co. 4600 E. 71st St., Cleveland 5, O.
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National Carbon Co., Inc., Carbon Products Div., 30 E. 42nd St., New York 17, N. Y.
Pennsylvania Foundry Supply & Sand Co., Ashland & E. Lewis Sts., Philadelphia 24, Pa.
Smith Oil & Refining Co., 1102 Kilburn Ave., Rockford, Ill.

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Thiem Products Co., 9800 West Rogers, Milwaukee 14, Wis.
United Oil Mfg. Co., 1429 Walnut St., Erie, Pa.
United States Graphite Co., Saginaw, Mich.

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CORE WIRE STRAIGHTENERS

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Robbins & Myers, Inc., Springfield, Ohio.
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Metalloy Corp., Rand Tower, Minneapolis 2, Minn.
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Wickland Co., A. A., 205 W. Wacker Dr., Chicago 6, Ill.

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Orton Crane & Shovel Co., 608 So. Dearborn, Chicago, Ill.

MATERIALS HANDLING DESIGN

Frank D. Campbell, 332 So. Michigan Ave., Chicago, Ill.

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Chisholm-Moore Hoist Corp. and Columbus-McKinnon Chain Corp., Tonawanda, N. Y.

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Frank D. Campbell, 332 So. Michigan Ave., Chicago, Ill.
Giffels & Vallet, Inc., Marquette Bldg., Detroit, Mich.
Lester B. Knight & Associates, Inc., 600 West Jackson Blvd., Chicago 3, Ill.

MELTING POTS

Acme Foundry Co., Detroit 16, Mich.

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N. Ransohoff, Inc., 16 E. 72nd St., Cincinnati 16, Ohio.

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Harry W. Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.

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Multiplex Machinery Corp., Elmore, Ohio

MIXERS (Sand and Clay)

American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
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Blystone Division, Standard Sand & Machine Co., 549 W. Washington St., Chicago 6, Ill.
Clearfield Machine Co., Clearfield, Pa.
Construction Machinery Co., Waterloo, Iowa.
Fordath Enginering Co. Ltd., West Bromwich, Birmingham, England.
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Jeffrey Mfg. Co., 907 N. Fourth St., Columbus 16, O.
Multiplex Machinery Corp., Elmore, Ohio
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Royer Foundry & Machine Co., Kingston, Pa.
Sather Mfg. Co., Everett, Wash.

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Parkwood Corp., Wakefield, Mass.

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Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Chain Belt Co., 1671 W. Bruce St., Milwaukee 4, Wis.
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Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
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Mathews Conveyer Co., Ellwood City, Pa.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.

MOLD DRYERS

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, Ohio.

MOLD OVENS and DRYERS

Carl-Mayer Corp., 3030 Euclid Ave., Cleveland 15, Ohio.
Despatch Oven Co., Minneapolis 14, Minn.
Foundry Equipment Co., 1831 Columbus Rd., Cleveland 13, O.
Lanly Company, 750 Prospect Ave., Cleveland 15, O.
Ross Engineering Corp., J. O., 350 Madison Ave., New York 17, N. Y.

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Clark Industrial Truck Div. of Clark Equipment Co., Battle Creek, Mich.

MOLD WASH

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Foundry Service Co., Birmingham, Ala.
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Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee 4, Wis.
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Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
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Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
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Davenport Machine & Foundry Co., Davenport, Iowa.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
International Molding Machine Co., LaGrange Park, Ill.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee 4, Wis.
Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
S. P. O. Incorporated, 7500 Grand Division Ave., Cleveland 5, O.
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Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
International Molding Machine Co., LaGrange Park, Ill.
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee 4, Wis.
Moline Iron Works, Moline, Ill.
Nicholls, Wm. H., Co., Richmond Hill, Long Island 18, N. Y.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, Ohio.
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Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.

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Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.

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American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
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Federal Foundry Supply Co., 4600 E. 7st St., Cleveland 5, O.
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Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.

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Freeman Supply Co., Toledo 5, O.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.
Industrial Pattern Works, 2621 Belmont Ave., Chicago 18, Ill.
Plaster Process Castings Co., 6922 Carnegie Ave., Cleveland 3.
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Tennessee Products & Chemical Corp., American National Bank Bldg., Nashville 3, Tenn.
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Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.

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Brown Instrument Co. Div. Minneapolis-Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia 44, Pa.
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Pyrometer Instrument Co., Bergenfield, N. J.
Tamms Silica Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.

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Pyrometer Instrument Co., Bergenfield, N. J.

PYROMETERS (Optical)

Pyrometer Instrument Co., Bergenfield, N. J.

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Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.
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American Wheelabrator & Equipment Co., 505 S. Byrkit St., Mishawaka, Ind.
Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
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Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.
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National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Newaygo Engineering Co., Newaygo, Mich.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
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Newaygo Engineering Co., Newaygo, Mich.

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Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, Ohio.
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Oliver Machinery Company, Grand Rapids 2, Mich.

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Baker Perkins Inc., Saginaw, Mich.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.

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Baker Perkins Inc., Saginaw, Mich.
Beardsley & Piper Co., The, 2424 N. Cicero, Chicago 39, Ill.
Blystone Division, Standard Sand & Machine Co., 549 W. Washington Blvd., Chicago 6, Ill.
Clearfield Machine Co., Clearfield, Pa.
Construction Machinery Corp., Waterloo, Iowa.
Freeman Supply Co., 1152 E. Broadway, Toledo 5, Ohio.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
Multiplex Machinery Corp., Elmore, Ohio
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Royer Foundry & Machine Co., Kingston, Pa.

SAND PREPARATION EQUIPMENT

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.
American Wheelabrator & Equipment Co., Mishawaka, Ind.
Ajax Flexible Coupling Co., Westfield, N. Y.
Baker Perkins Inc., Saginaw, Mich.
Bartlett & Snow Co., C. O., 6201 Harvard Ave., Cleveland 5, O.

SAND PREPARATION EQUIPMENT (Cont'd.)

Beardsley & Piper Co., The, 2424 N. Cicero, Chicago 39, Ill.
Clearfield Machine Co., Clearfield, Pa.
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Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
Jeffrey Mfg. Co., 907-99 N. Fourth St., Columbus 16, O.
Moulders Friend, Dallas City, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, O.
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Sather Mfg. Co., Everett, Wash.
Simplicity Engineering Co., Durand, Mich.

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Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Chicago Pneumatic Tool Co., 6 East 44th St., New York 17, N. Y.
Cleco Pneumatic Tool Div., Reed Roller Bit Co., Houston, Texas.
Dayton Pneumatic Tool Co., Dayton 1, O.
Herman Pneumatic Machine Co., Union Bank Bldg., Pittsburgh 22, Pa.
Mastern Pneumatic Tool Co., Inc., Orwell, Ohio.
Rotor Tool Co., 17325 Euclid Ave., Cleveland 12, Ohio.

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Hydro-Blast Corp., 2550 N. Western Ave., Chicago 47, Ill.
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National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Nichols Engineering & Research Corp., 60 Wall Tower, New York 5, N. Y.
Stearns Magnetic Mfg. Co., 662 S. 28th St., Milwaukee 4, Wis.

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Beardsley & Piper Co., The, 2424 N. Cicero, Chicago 39, Ill.
Champion Foundry & Machine Co., 1314 W. 21st St., Chicago 8, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Foundry Supplies & Mfg. Co., 2221 Orchard St., Chicago 14, Ill.
Great Western Mfg. Co., Leavenworth, Kansas.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Roller Riddle Corp., P. O. Box 178, Port Huron, Mich.
Royer Foundry & Machine Co., Kingston, Pa.
Simplicity Engineering Co., Durand, Mich.
Pangborn Corp., Hagerstown, Md.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

SAND STORAGE BINS & GATES

Bartlett & Snow, C. O., Co., 6201 Harvard Ave., Cleveland 5, Ohio.
Beardsley & Piper Co., The, 242 No. Cicero, Chicago 39, Ill.
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Beardsley & Piper Co., 2424 N. Cicero, Chicago 39, Ill.
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Pangborn Corp., Hagerstown, Md.

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Cleveland Metal Abrasive Co., 887 E. 67th St., Cleveland, Ohio.
Globe Steel Abrasive Co., Mansfield, Ohio.
Metal Blast, Inc., 871 E. 67th St., Cleveland, Ohio.
National Metal Abrasive Co., 3560 Norton Ave., Cleveland 7, O.
Pangborn Corp., Hagerstown, Md.
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Simonds Abrasive Co., Tacony & Fraley Sts., Philadelphia 37, Pa.
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Redford Iron & Equipment Co., 20733 Glendale Ave., Detroit 23, Mich.

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Experienced practical man for production of light and medium weight castings on air squeezer molding machines exclusively. Must be well versed in cupola operation, sand control, the gating and rigging of patterns for high production and minimum scrap losses. Man with pattern shop experience preferred. Only reliable man with ability and proven record will be considered. In replying state age, experience, past employers and salary expected. Address: Box 642, The FOUNDRY, Cleveland 13, Ohio.

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Excellent opportunity for full qualified man to fill position of foundry superintendent in a nonferrous foundry. Must be experienced in all phases of work and must be able to assume complete charge of all operations. State full details in first letter as to past employment, positions held, salary requirements, etc. Address: Box 637, The FOUNDRY, Cleveland 13, Ohio.

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Between 35 and 40 years for gray iron foundry near Philadelphia. Experienced and capable of getting along with men and reducing losses to minimum. Must have good educational background and technical training. Qualified to rig jobs, both jobbing and production. State past history and salary expected and when ready to start. Address: Box 581, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

FOUNDRY SUPERINTENDENT

Twenty-six years' practical experience. Apprentice to manager. Sixteen years in supervision—8 years in meehanite. Producing machine tool, hydraulic, heat resisting, high tensile or castings to be flame or quench hardened, made in loam, dry or green molds. High production machine molding including sandslinger. Well versed in sand control—synthetic or natural. Capable trainer of apprentices. Address: Box 638, The FOUNDRY, Cleveland 13, Ohio.

SALES ENGINEER OR PURCHASING AGENT

Nine years' experience in sales and purchasing of foundry supplies and equipment. Thorough knowledge of foundry problems. Now with large foundry supply jobber. Southwest or Central West preferred. Address: Box 632, The FOUNDRY, Cleveland, 13, Ohio.

METALLURGIST

Graduate Metallurgist, 13 years' experience in special metallurgical problems involving heat treating, specifications, development, stress analysis, trouble shooting, nodular irons; malleable, gray iron and steel. Prefer position with firm interested in development and production of nodular irons. Address: Box 630, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Twenty-eight years' experience as foundry superintendent. Practical molder. Understand cupola thoroughly. Prefer position with foundry making high grade castings. At present employed. Address: Box 571, The FOUNDRY, Cleveland 13, Ohio.

METALLURGIST

Fifteen years' experience involving cupolas and electric furnaces. Any kind of iron made to close specifications. Versed in chemical and physical testing and sand control. Best references. Address: Box 557, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

FOUNDRY SUPERINTENDENT

Twenty-two years in machine tool foundries and others requiring cast iron of similar high quality. Superintendent and assistant for five years. Age 39. Now employed. Address: Box 142, The FOUNDRY, Cleveland 13, Ohio.

STEEL FOUNDRY FOREMAN

Thirty years' experience in steel and high nickel alloy, small and medium size castings. Best of references. Address: Box 614, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN

With twenty-three years' experience, desires position with progressive foundry. Have technical knowledge of sand control and gating and heading. Will go anywhere. Prefer Northeast. Best of references. Member A.F.S. Address: Box 639, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT OR GENERAL FOREMAN

Desires position with progressive foundry. Ten years as general foreman and foundry superintendent in gray iron shop pouring up to 40 tons per day. Under 40—good references. Address: Box 640, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Thirty years' experience in sand with last four years as foundry superintendent. Qualified record in production, knowledge of mixing both steel and gray iron. Understand cupola, sand control and costs. References. Address: Box 607, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY ENGINEER OR FOUNDRY MANAGER

Aluminum—magnesium—permanent mold designer and qualified management experience. Quality and production control. Tool and machine design. Ten years' experience. Capable of taking complete charge of permanent mold foundry. Address: Box 608, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY METALLURGIST

B.S. degree in metallurgical engineering. Experienced in producing steel in the three phase, direct arc, electric furnace, also familiar with melting grey iron in either the electric furnace or the cupola. Possess a good knowledge of laboratory procedures, sand testing and radiography work. Will make every effort to lower scrap losses and costs. Address: Box 465, The FOUNDRY, Cleveland 13, Ohio.

PRESSURE CAST MATCHPLATE MAKER

Able to set up and operate a matchplate shop. Thoroughly experienced in the production of matchplates, cope and drag equipment, core boxes, driers and pattern castings. Would also be interested in experimental work on casting metal into plaster molds. Address: Box 623, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MASTER MECHANIC

Over 30 years' experience in modern foundry. Specialist in sand handling system, can take complete charge of foundry maintenance. Supervised men past 25 years. Background tool maker, technical and engineering school. Employed now, can give good references. Address: Box 624, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT OR MANAGER

Practical foundryman, energetic with twenty years' experience in jobbing and production or gray iron, bronze aluminum and kirksite. Automotive light, medium and heavy castings, made in green dry and loam sands. Ten years in supervision and management. Excellent record or labor relations and high productivity. Age 41, married, college graduate, prefer Eastern states area. Address: Box 635, The FOUNDRY, Cleveland 13, Ohio.

Classified Advertising

Positions Wanted

PLANT MANAGER—SUPERINTENDENT

Thinking of making a change in your top personnel? Now is the time to do it for many capable men are available due to present business conditions. I have twenty-eight years of experience producing gray iron castings on production and jobbing basis. During the past seventeen years I have held the top position in managing plants employing up to 400 employes. Have a successful record, am 45 years of age, very reliable and in very good health. Address: Box 636, The FOUNDRY, Cleveland 13, Ohio.

GRAY IRON & SEMI-STEEL SUPERINTENDENT

22 years' foundry experience with 17 years in one foundry as superintendent. Understand cupola practice, rigging and gating. Production or jobbing work, heavy or light. McLain graduate. Can handle men. Go any place. Address: Box 628, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER OR SUPERINTENDENT

Age 39, married. Broad experience in light and medium gray iron jobbing work. Some experience in both cast and wrought steel. College level technical training as engineer. Experienced in job cost, estimating, purchasing and general product control. Successful record in labor management. Now employed but desires more progressive connection. Would consider position in foundry service engineering. Salary expected, $6000 minimum. Address: Box 641, The FOUNDRY, Cleveland 13, Ohio.

MANAGER—SUPERINTENDENT

Is your trouble cost, sand, metal or labor relations? Castings to stand pressure a specialty. 32 years old. Practical gray iron foundryman. Sixteen years best of practical training. Ex GI working for degree. Now shop superintendent desirng more promising connection. Address: Box 633, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Experienced in all phases of foundry practice now available in any capacity. Familiar with present day labor conditions, costs, attitude of workers and qualified to do something about it. If interested address: Box 646, The FOUNDRY, Cleveland 13, Ohio.

IRON & BRASS FOUNDRYMAN

Practical with technical training and over 30 years successful supervisory record. Molding machine production, high test irons, heat and chemical resisting irons, chilled roll iron, machine tool, diesel, gas engine, jobbing castings lights to heavy, green sand, dry sand and loam. Salary moderate. Percentage of savings on reduced casting losses and increased earnings. Age 54, married. Address: Box 643, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY ENGINEER

Graduate metallurgist with experience as superintendent. Plant manager and sales manager desires permanent position. Experienced in gray iron foundries with cupola operations, molding methods, sand conditioning and sand handling in both jobbing and production foundries. Have had the same experience in electrical steel foundries producing alloy and plain carbon steels. Familiar with heading, gating and rigging of patterns and also the making of patterns. Age 36. Willing to move anywhere in the United States. Address: Box 645, The FOUNDRY, Cleveland 13, Ohio.

PRACTICAL FOUNDRYMAN

Ferrous and nonferrous with both practical and technical training. A-1 metal man up-to-date on light and heavy castings. Capable of taking complete charge. Address: Box 644, The FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT OR GENERAL FOREMAN

Forty years' practical experience, light, medium and heavy work, production or jobbing. Plenty of machine experience including sand slinger. Am a man of proven ability. Salary to be left open until I show you. Address: Box 547, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

WORKS MANAGER OR FOUNDRY SUPERINTENDENT

Thoroughly capable and of proven ability to reduce costs, reduce scrap percentage and to better quality of castings. Good handler of labor relations. Ferrous metals. Address: Box 595, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER

Experienced in stainless, heat resisting and special alloys, also grey iron and steel. Metallurgical training. Familiar with all phases of foundry operations, willing to demonstrate ability on reasonable terms with progressive employer. Address: Box 625, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER

Top flight foundry manager available. Experienced in all phases of the modern gray iron foundry. Ten years' meehanite experience, technical training, research work, development sales and customer contact. Thirty years' experience. Address: Box 477, The FOUNDRY, Cleveland 13, Ohio.

INFORMATION WANTED

Address of Wm. D. Van Arman, who some years ago was with The Lake Erie Smelting and Refining Co. of Cleveland. Address: WM. C. KEOUGH, 800 NATIONAL CITY E. 6th BUILDING, CLEVELAND 14, OHIO.

PATTERN SHOP FOR SALE

We are entrusted with the sale of a going full blast pattern shop making production patterns for all types of castings. The well established business goes lock, stock and barrel and services prominent firms in the Pacific Northwest from a centrally located point (not on the coast). The equipment alone less than three years old cost more than $17,000.00 which is the full sales price and includes everything but the real estate which purchaser leases. Address: G. T. HIGGINS AND SONS, BROKERS, ATTN.: ROBERT M. KOHN, LOBBY PAULSON BUILDING, SPOKANE 8, WASHINGTON.

Open Capacity

AVAILABLE CAPACITY

Our foundry has open capacity to supply small and medium size gray iron castings. Send sample. Address: OREGON CASTINGS CO., RD 3, Lititz, Pa.

For Rent

FOR RENT

Nonferrous foundry, fully equipped for four moulders. Low rent. Address: EAST FOUNDRY, BOX 395, ROCHESTER, NEW YORK.

Engineering Service

HERBERT F. MILLER

CONSULTANT IN FOUNDRY OPERATIONS

AND ENGINEERING

1808 HANCOCK ST.
ROCKFORD, ILLINOIS

GRAY IRON, MALLEABLE IRON & STEEL

Opportunities

THE CUPOLA IS THE HEART OF THE FOUNDRY

Turn the searchlight of McLain's System on your cupola. 90c of every dollar is spent before melting begins—but some make it look like 30c by indifferent melting. Are you using the maximum percentage of steel scrap in your castings? If not, why not? The value of the scrap pile lies in the fact that it offers you food for thought. Our system is worth the fee as a desk reference. Free information.

McLAIN'S SYSTEM INC.
236 E. NORTH AVE. MILWAUKEE 12, WIS.

OPPORTUNITY

We can furnish at any point slack, fibre and tight barrels; also fibre and steel drums. Address: BUCKEYE COOPERAGE COMPANY, 3807 ORANGE AVENUE, CLEVELAND 15, OHIO.

OPPORTUNITY

We have a foundry and machine shop equipped for smaller type work in quantities. We are looking for a small or medium type machine to manufacture, engineer and sell. Address: Box 551, The FOUNDRY, Cleveland 13, Ohio.

Foundries For Sale

FOUNDRY FOR SALE

Corporation desires to sell its gray iron production foundry near Kansas City. Good scrap market and utilities extremely low. Two railroad sidings. Capacity 10 to 15 tons daily. 30,000 sq. ft. floor space, pouring room 300 ft. long with overhead conveyors. Modern core room. Plant well equipped. Location presents many advantages for low cost production with ideal labor situation. Can be used for general manufacturing. Reasonably priced. Address: Box 602, The FOUNDRY, Cleveland 13, Ohio.

GRAY IRON FOUNDRY FOR SALE

Very profitable pouring 4 to 5 tons per day. Northern Pennsylvania. Only industry in town. $35,000 total price. Address: Box 446, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOR SALE

Pattern shop and foundry serving Southwest with light production castings and modern equipment. Good business. Address: Box 617, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE OR LEASE

Complete foundry—or will sell equipment and buildings separately. Located Logansport, Indiana, 30,000 population, only foundry in town. Address: Post Office Box 710, Muncie, Indiana—phone 5539.

FOUNDRY FOR SALE

Going business, approximately $100,000.00 annually. Free of debt. Foundry building with office on street. Hard iron castings. Orders on hand. Located on spur track. Price $48,000.00 plus inventory. Address: Box 592, The FOUNDRY, Cleveland 13, Ohio.

Classified Advertising

Foundries For Sale

LIQUIDATION SALE
FOUNDRY AND EQUIPMENT

Twenty-five miles from Boston toward Cape Cod appr. 3 acres of land with 2 railroad sidings. Main foundry building of metal and brick construction is 310 ft. long, 90 ft. wide and 45 ft. high also side buildings, sheds and separate office building. Melt cap. is 20 to 40 tons daily.

Included in sale is dismantled sand handling system in fine condition consisting of 20 moulders' hoppers, two 25 ton sand storage bins, one #50 Beardsley & Piper Speed mullor with 40 HP motor, magnetic separator with bucket elevator, overhead monorail system and cab controlled electric hoist and monotractor and shell buckets with automatic trips for delivering sand from speed mullor to moulders' hoppers.

Other equipment includes 2 American Wheelabrators 36 x 42, 80 moulding machines of various types, sand mullers, American Tablast, 3 coreblowers, 2 Whiting #6 cupolas and 1 #7 cupola, Screenarators, grinding machines, hoists etc.

List of equipment will be mailed on request.

All items are offered subject to prior sales.

OLD COLONY FOUNDRY CO.
EAST BRIDGEWATER, MASSACHUSETTS

FOR SALE

BRASS & ALUMINUM FOUNDRY

In operation—completely equipped—immediately available in Ohio area. Old established firm, good accounts, capacity 8 tons daily, experienced labor. Owners desirous of disposing to liquidate estate.

BOX 559

THE FOUNDRY CLEVELAND, 13, OHIO

Wanted-To-Buy

WANTED

1-16 x 36 type RCS rotary positive type—Roots-Connersville blower or equivalent for cupola operation. Address: DAYTON STEEL FOUNDRY CO., P. O. BOX 1022, DAYTON 1, OHIO.

WANTED

WATER WORKS FITTING PATTERNS
Valve Box—Curb Box—Sleeves—Tees
Elbows—Bends—etc.

BOX 605

THE FOUNDRY CLEVELAND 13, OHIO

WANTED

Oil fired crucible furnace with blower, motor and oil pump. Address: Sanitary Co. of America, Linfield, Pa.

WANTED

Patterns for Bell and Spigot and Flanged cast iron fittings, sizes 4-inch and larger. Address: Box 612, The FOUNDRY, Cleveland 13, Ohio.

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price or immediate acceptance. Address Box 578, The FOUNDRY, Cleveland 13, Ohio.

WANTED

1—Used International type SB13 or SB15 core blower with rollers in table in good working condition.

2—Used International type PK molding machines with 18" squeeze cylinder in good condition.

BOX 610

THE FOUNDRY CLEVELAND 13, OHIO

Foundries for Sale

Wanted-To-Buy

WANTED

1200 lb. capacity oil fired tilting crucible furnace. Address: Box 647, The FOUNDRY, Cleveland 13, Ohio.

Manufacturer's Agents

MANUFACTURER'S AGENTS

Apex Core Oil sales distributors with proven sales record to the foundries. Open territories in Milwaukee, St. Louis, Toledo and Birmingham areas. Excellent opportunities.

APEX MOTOR FUEL COMPANY
INDUSTRIAL DIVISION
1401 W. NORTH AVENUE
CHICAGO 22, ILLINOIS

MANUFACTURERS' AGENTS

Sales representatives to sell core oils in Michigan and Alabama. Address: Box 556, The FOUNDRY, Cleveland 13, Ohio.

Employment Service

SALARIED POSITIONS
$3,500—$35,000

If you are considering a new connection communicate with the undersigned. We offer the original personal employment service (39 years recognized standing and reputation). The procedure, of highest ethical standards, is individualized to your personal requirements and develops overtures without initiative on your part. Your identity covered and present position protected. Send only name and address for details.

R. W. BIXBY, INC.
101 DUN BLDG. BUFFALO 2, N. Y.

SALARIED PERSONNEL

$3,000-$25,000. This reliable service, established 1927, conducts confidential negotiations for high-grade men who seek a change of connection under conditions assuring, if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Address: JIRA THAYER JENNINGS, 241 ORANGE STREET, NEW HAVEN 10, CONN.

Accounts Wanted

ACCOUNTS WANTED

Manufacturers' agent desires gray iron or steel casting account for the Chicago area.

BOX 631

THE FOUNDRY CLEVELAND 13, OHIO

RAW MATERIALS ACCOUNTS

Sales agent selling nonferrous foundries desires additional raw material lines. Southern Ohio, Southern Indiana, Ky. and West Virginia.

BOX 616

THE FOUNDRY CLEVELAND 13, OHIO

For Sale

MEXITE

Overstocked and will sell at sacrifice.
THE MILLER FOUNDRY COMPANY

740 JENKINS AVENUE
COLUMBUS, OHIO

IDLE FOUNDRY EQUIPMENT FOR SALE

6 Core machines
23 Molding machines
2 Gas powered sand cutters
4 Grind stands
15 Hand trucks
16 GE Motors, ¾ to 75 HP
And misc. foundry equipment
Subject to inspection at our plant or write for description of items you are interested in.

ALBION MALLEABLE IRON CO.
ALBION, MICHIGAN

NEVER USED—WILL SACRIFICE

One molding machine #559 jolt stripper made by Osborn Mfg. Co. One molding machine #442 jolt rockover pattern draw made by Osborn Mfg. Co.

THE ENTERPRISE MFG. CO. OF PA.
3rd & DAUPHIN STREETS
PHILADELPHIA 33, PA.

FOR SALE

One Olsen testing machine, 30,000 pounds capacity, in good condition.

BOX 627

THE FOUNDRY CLEVELAND 13, OHIO

FOR IMMEDIATE SALE

VIBRATING SCREEN — Tyler-Niagara Type #300. Serial #8733". Size—72" x 48". V-belted motor drive. Complete with gear reducers, sheaves, and Jeffrey Belt Conveyor Bucket Type Elevator.

JOLT SQUEEZE PATTERN DRAW MOLDING MACHINES—Johnson & Jennings. NEW IN 1943. Table size—15" x 21". Head Platen size—12" x 8".

HAND ROLLOVER POWER DRAW MOLDING MACHINE—SPO. Complete with run out car. Size inside frame—22½" x 72".

#6T Ransome Tailstock, 16,000# capacity. Faceplate size 53" x 53". Distance floor to spindle center—49". Two available—like new.

VENTILATING FANS, 36" floor and wall models, 220 volts.

7—Milwaukee #143-9 jolt squeeze strip machines. NEW in 1944. Stationary type. 14" diameter squeezing piston, 8" jolting piston diameter. Squeezing stroke—11". EXCELLENT CONDITION—IMMEDIATE SHIPMENT.

1—Davenport #24-SA rollover machine.

FALK MILL SUPPLY CO., INC.
18 WARD ST.
ROCHESTER 5, N. Y.
PHONE—HAMILTON 8745

Classified Advertising

For Sale

EQUIPMENT FOR SALE

MOLDING MACHINES
3—75J Osborn Jolt Squeeze.
2—SPO #611-B Stationary, Oscillating, Jolt, Squeeze Strippers.
1—SPO #4½ JHS Air Jolt Hand Strip.
3—Mumford 3" Cyl. Core Jolt, with 20" x 15" Table.
4—Osborn #36 core box drawing machines.
BLOWERS FOR CUPOLAS AND FURNACES
1—Piqua rotary pressure blower, rated 19 cu. ft. per revolution.
Maxon-Premix Blowers for Gas, ¼ to 1 H.P.
METAL MELTING EQUIPMENT
1—Hausfeld 2000# Aluminum Capacity Furnaces. Barrel Type, Open Flame, Oil Fired.
2—Monarch-Rockwell Rotating, 500# Brass, Oil New 32" to 41" Dia. Shell Cupolas made to order.
1—Buckeye #150 crucible tilting furnace, with premix blower for gas fire.
TUMBLING MILLS AND SAND BLAST
1—Pangborn style GJ-1 rotoblast barrel, complete with Pangborn style FM automatic loader. Load capacity approximately 16 cu ft.
1—Pangborn No. 2 GH direct pressure type sandblast barrel, motor driven. Complete unit.
1—Pangborn LE 6 ft. sandblast table, continuous sand feed, motor driven. Complete unit.
1—Pangborn LE 4 ft. sandblast table, continuous sand feed, motor driven. Complete unit.
1—Pangborn Sand Blast Unit including generating tank, shot cleaner, bucket elevator. Suitable for use with room.
1—Pangborn type EN-2 sand blast cabinet, suction type, 5 x 3 x 7 high.
MISCELLANEOUS
1—Gardner-Denver air compressor complete with 5 HP 3/60/220 motor and controls.
4—Heavy duty flexible shaft grinders 2 HP.
1—Heavy Duty Back Geared Sprue Cutter, 1½" square knives, T & L Pulley Drive.
1—Fay & Egan 14" blade revolving, double arbor, tilting table, variety saw with roller table.
1—Young Bros. Co. tower core oven, 5' x 1' shelves, gas fired, complete with Foxboro Control.
1—Young Bros. Co. batch type recirculating hot air gas fired core oven, 5' x 6' door opening, 9' deep.
3—Foundry Equipment Co. sliding shelf core ovens with five 30 x 42" shelves, 8" high. Gas Fired.
1—Lampson Endless Mold Conveyor 100' long x 16' wide, with 19 x 26" pallets, 36 inches on centers.
2—Warner material elevators 1000# capacity, 20' lift, 2' x 2' two tier cab.

CLIFTON MACHINERY CO.
1023 W. 6th ST. CINCINNATI 3, OHIO
PHONE PARKWAY 7812

FOR IMMEDIATE DISPOSAL
AT ADVANTAGEOUS PRICES

1—New Ransohoff 36" x 60" Wet Mill—Side loading and unloading.
1—Used Mill, same as above.
1—Used Ransohoff 56" x 72" Wet Mill—end loading and unloading, also auxiliary equipment consisting of Power Loader, Sludge Ejector and Pump, Settling Tank and Water Tank.
1—Climax Wire Straightener No. 3A capacity ¼" to ¾".

For full details write or wire:—

F. F. BARBER MACHINERY COMPANY,
187 FLEET STREET WEST,
TORONTO, ONT.

ROTOCLONES

1 type D, size 20 (1944) $500.00
1 type D, size 16 (1945) $450.00

Neither machine used since 1945 and both are in excellent condition. Motors not included.

MR. WARNER
LIBERTY PLANERS, INC., HAMILTON, OHIO

FOR SALE

One 70" model "M" American sand cutter with 75' of cable, 1 plug and 6 receptacles. Standard motors, for 220V, 60 Cy, 3 phase current. Used four years, in excellent condition. Address: INDEPENDENCE STOVE & FURNACE CO., INDEPENDENCE MISSOURI.

For Sale

FOR SALE

TURBO BLOWERS (3 Phase, 60 Cycle)

cfm	Pressure	Make	Motor H.P.	Volts	Speed
3500	40 oz.	Spencer	60	440	1800
2200	40 oz.	Spencer	40	220/440	3600
1300	16 oz.	Nth. Amer.	10	440	1800
1050	32 oz.	Spencer	15	550	3500
900	24	Spencer	15	220/440	1800
650	32	Spencer	10	220/440	3600
225	10	Spencer	1	220/440	3600
150	3 lbs.	Spencer	5	220/440	3600

PRESSURE BLOWERS (3 Phase, 60 Cycle)

2500	7 oz.	Sturtevant	15	220/440	1800
2400	14 oz.	Mahr	15	220/440	3480
1400	8 oz.	Robinson	5	220/440	3600
1150	20 oz.	Nth. Amer.	10	220/440	3600
950	16 oz.	Nth. Amer.	7½	220/440	3600
660	20 oz.	A & B	7½	440	3600
550	20 oz.	A & B	5	440	3600
450	6 lbs.	A & B	30	220/440	3450
340	20 oz.	A & B	3	440	3600
250	12 oz.	Gen. Elec.	2	220/440	3600
150	12 oz.	Nth. Amer.	1	220	3600
150		McKee	1	440	3600

MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVENUE
CLEVELAND, OHIO

FOR SALE

Osborn molding machines—#601 and #602
#94 Osborn core blowers
3 H.P. snag grinder
40-600 Amp. A.C. welders
vertical core ovens, air compressors, etc.
We can supply single items or complete foundries. Send your inquiries to:

BALCHER MACHINERY COMPANY
1884 S. COMPTON ROAD
CLEVELAND HEIGHTS 18, OHIO

FOR SALE

Foundry Equipment of all kinds and all makes too numerous to mention. Please write for particulars.

HAYNES FOUNDRY EQUIPMENT
814 ADA ST. KALAMAZOO 52, MICH.

FOR SALE

1—Louisville Sand Cooler, 5 ton per hour capacity—New.
1—Link Belt Sand Drier and auxiliary equipment—Used.
1—Large Mahon Horizontal Core Oven with Link Belt Conveyor System—Used.
1—Model 500 P&H Crawler Crane Gasoline Driven with 40' boom and 10 K.W. Generator Set—Used.
Anyone interested in above equipment contact:

CENTRAL FOUNDRY DIVISION
GENERAL MOTORS CORPORATION
DANVILLE, ILLINOIS

FOR SALE

1—American Wheelabrator Size 20 x 27 complete with dust collector, spare parts
3—Tons #G 50 Grit
1—Gardner-Denver air compressor, complete with 10 H.P. motor
1—Fisher Blower with 10 Horse Motor
2—Time clocks
2—Furnaces with oil burners complete
25—13" x 18" steel flasks
12—12" x 18" steel flasks
Other miscellaneous foundry equipment.

H. G. WILLIAMS
7206 EAST TRUMAN ROAD
KANSAS CITY 3, MISSOURI

FOR SALE

1—612-B Johnston & Jennings portable rollover, pattern draw, molding machine in good working condition.
1—681-C Johnston & Jennings portable jolt stripper in good working condition.
4—12" portable Haynes jolt squeezer molding machines in good working condition.
Above six machines priced right for quick disposal.

BOX 611
THE FOUNDRY CLEVELAND 13 OHIO

For Sale

FOR SALE
FOUNDRY EQUIPMENT

1—American Wheelabrator Model 1 Multi table with (12) 8" diameter Auxiliary tables serial #69867 220/440 60 cycle 3 ph. American Diestube Dust Collector Model 85 assembled type cloth area of 720 square feet. 1750 CFM at 2:32-1 ratio.

1—American 36 x 42 Wheelabrator Tumblast 11½ cubic feet capacity 220/440 60 cycle 3 ph. complete with all controls and a complete set of spare parts.

MR. E. DUNHAM
509 WABASH EFFINGHAM, ILL.
PHONE—1190

FOR SALE

4—Adams jolt squeeze molding machines 10"-32", (3 new, one used about one year); 1 used Haynes jolt squeeze machine, 12" x 16"; 1 used Osborn jolt squeeze machine, 16" x 22"; 1 used Osborn jolt rollover, pattern draw, portable molding machine #602 and jolt stripper machine #558. Address: THUNDER BAY MFG. CORP., ALPENA, MICH.

GOOD USED EQUIPMENT

Sly dust collecting system consisting of 3 Sly #62 dust filters to handle 15,000 CFM each. Motors 220/440 volt, 3 phase, 60 cycle. Was erected but not used.

2—5-ton bridge cranes, 30' span, 3 motor, cab operated, 230 volt DC, equipped with magnet controller and enclosed cab.

IRA C. JORDAN
2508 EAST BELLEVIEW PLACE
MILWAUKEE 11, WIS.

FOR SALE

4 Used Tabor Jolt Squeeze Machines
1 Used Fisher Tilting Oil Fired Furnace, Size 125, with Blower and Oil Pump.
2 Used Buzzer A M 200 Gas Fired Furnaces
1 Used Simpson #1 Model H Muller with 5 Hp Motor.
1 Used Ingersoll Rand 8 x 8 Class N E I Compressor with 15 Hp Motor ad Tank.
1 Used Doall Model M C Saw with Motor.
Also a wide selection of Used Slip Flasks.

THE FOUNDRY SUPPLY COMPANY, INC.
404 SOUTH THIRD ST. MINNEAPOLIS 15, MINN.

FOR SALE

CUPOLA CHARGER

2 ton P & H monorail unit, cab operated, 30' lift, 2 motors 3-60-220-440. This outfit complete with charging bucket and 79' of all steel crane way.

UNIVERSAL ENTERPRISES, INC.

P.O. BOX 5033 PHONE Y 1894 TAMPA, FLA.

FOUNDRY EQUIPMENT

1—Osborn Core Blower, No. 193
1—Demmler Core Blower, Style 3-E
1—Osborn Core Box Drawing Machine #146
Molding Machines—Herman R. O. 1500 lb cap.
Osborn Jolt Squeezers, various sizes
1—Simpson Mixer, motor drive
1—#30 B. & P. Speedmullor

RAY P. SCULLY
SCULLY MACHINERY & EQUIPMENT CO., NOT INC.
767 MILWAUKEE AVE. CHICAGO 22, ILL.
PHONE: CANAL 6-0314

Classified Advertising

For Sale

GOOD USED EQUIPMENT

1—International Power Rollover, Type GJ, Size 22" x 8", Serial #39275-8.

1—Tabor Squeeze Molding Machine #12591.

1—Tabor Overhead Jolt Squeeze #19333.

1—Tabor Overhead Jolt Squeeze #17301.

1—Jolt Pin Stripper, 3000# Jolt & Lift.

1—#440 Jolt Squeeze & Draw Rollover.

New and Used North American and Spencer-Turbo Pressure Blowers—All Sizes.

STATE MACHINERY & METAL CO.

160-2 GOVERNOR ST. PATERSON, N. J.

ARMORY 4-4959 or 4971

FOR SALE

Niagara #56 hand lever punch 2" throat bench type.

Detrex dressing solvent reclamation still 36" W 48" L 74" H ½-3-60-220/440 motor.

Rivet sorting machine portable 3 feed hoppers, chutes and distributing discs 110V.

Two goulds rotary pumps size IMB-2S head 289 ft. 3550 gpm #358A467-1. Flexible coupled to Westinghouse type CS sealed bearing motor 15-3490-3-60-220/440.

3D Gardner buffing machines 5 H.P. motor 220/440. New in 1944. Each side can be operated independently.

MANSFIELD SANITARY POTTERY

PERRYSVILLE OHIO

For Sale

FOR SALE

4000# capacity automatic power revolving fork. Carriage for lift truck. Address: UNITED STATES METAL PRODUCTS CO., P.O. BOX 1067, ERIE, PA.

FOR SALE

Despatch style S gas fired core drying oven, excellent condition. Width 8 ft., height 8 ft., length 12 ft. Complete with control equipment. For specifications write: UNIVERSAL CASTINGS CORP., 5821 WEST 66th ST., CHICAGO 38, ILL.

FOR SALE

Skip bucket 30 cu. ft. capacity, together with hoist unit, Whiting gear unit. Hoisting speed 55 ft. per minute. In first class condition. Address: Box 626, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

SLIGHTLY USED BEARDSLEY & PIPER SAND SLINGER COMPLETE AND IN EXCELLENT CONDITION. NEW IN 1946.

FRANK W. SMITH INC.

450 CHESTNUT ST. GARDNER, MASS.

For Sale

FOR SALE

4—Tabor overhead squeeze machines

1—Davenport jolt machine, type A.J.S. #229

1—Two wheel floor type grinder with 7½ H.P. motor

1—Tabor—Abrasive cutoff machine—type D5AC

BARNES MANUFACTURING CO.

MANSFIELD, OHIO

FOR SALE

100 Style LL Sterling steel flasks. 31⅝" x 41" x 4" cope x 5" drag, 44" pin centers. Complete specifications on request. Excellent condition. Address: Box 634, The FOUNDRY, Cleveland 13, Ohio.

FLASKS

Large quantity of steel and cast iron flasks for sale at low prices. Write for list: BAY CITY FOUNDRY CO., 400 WEBSTER ST., BAY CITY, MICH.

FOR SALE

1—Used model AS vertical centrifugal casting machine, complete with motor and controls. Excellent condition. Located in Rockford, Illinois. Address: Box 609, The FOUNDRY, Cleveland 13, Ohio.

CLASSIFIED ADVERTISING RATES

POSITION WANTED—Minimum advertisement set solid, 30 words, $2.00. Additional words 7c each.

ALL OTHERS—"Help Wanted"—"For Sale"—"Wanted"—"Personals"—"Services", etc., minimum advertisement set solid, 30 words or less, $4.00. Additional words 12c each.

NOTE—If replies are to be sent to a box number in care of THE FOUNDRY, add 6 words to your advertisement for box number and address.

Any advertisement set in all capital letters, add 50% to the above rates.

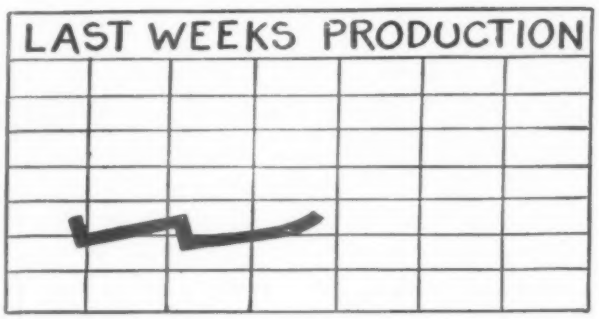
INCH RATES PER INSERTION

Single Column 2¼" Wide	One Time	Three Times	Six Times	Twelve Times
1 inch	$ 12.00	$11.00	$10.00	$ 9.00
2 inches	21.75	20.00	18.25	16.75
3 inches	32.00	29.25	26.75	24.00
4 inches	40.00	36.75	33.25	30.00
5 inches, ½ col.	48.00	44.00	40.00	36.00
6 inches	58.75	53.25	48.00	42.75
7 inches	66.00	60.00	54.00	48.00
8 inches	73.25	66.75	60.00	53.25
10 inches, 1 col.	88.00	80.00	72.00	64.00
Half Page	130.00	120.00	110.00	100.00
Full Page	220.00	200.00	180.00	160.00

Remittance should accompany advertisement when submitted—Cash Discount 2%, 10 days.

THE FOUNDRY

Penton Building, Cleveland 13, Ohio



Boost your employee-participation in the Payroll Savings Plan and you boost your production!

You are skeptical? Then consider this logic: The more U. S. Savings Bonds an employee holds, the more secure he feels. The more secure he feels, the greater his peace of mind—the more contented he is with his job. Results? Less absenteeism, less labor turnover, fewer accidents. *End result: increased production.*

And you needn't depend on theory alone. For those company benefits of the Payroll Savings Plan are borne out in the experience of more than 20,000 companies promoting the Plan.

LONG-RANGE BENEFITS, TOO

Bond sales spread the national debt, thus increasing our national economic security. And, of course, what's good for that is also good for you and your business.

The individual Bond Buyer gets back $4, when his Bonds mature, for every $3 he invested. That's a boon for him, and—multiplied by millions of Bond holders—represents a huge backlog of purchasing power that will help assure national prosperity through the years ahead.

IT'S EASY TO BOOST PARTICIPATION

1. See that a top management man sponsors the Plan.

2. Secure the help of the employee organizations in promoting it.

3. Adequately use posters and leaflets and run stories and editorials in company publications to inform employees of the Plan's benefits to them.

4. Make a person-to-person canvass, once a year, to sign up participants.

These first four steps should win you 40-60% participation. Normal employee turnover necessitates one more step:

5. Urge each new employee, at the time he is hired, to sign up.

Nation-wide experience indicates that 50% of your employees can be persuaded to join—without high-pressure selling. All the help you need is available from your State Director, U. S. Treasury Department, Savings Bond Division. He is listed in your phone book.

The Treasury Department acknowledges with appreciation the publication of this message by

THE FOUNDRY

This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and the Advertising Council.

WHY KEEP ON PAYING FOR SCRAPPED CASTINGS?

The figures here (look at them) are typical of operating records of foundries which have no dependable sand control procedure. These figures show exactly what to expect when SAND MOISTURE is TOO HIGH or TOO LOW. The same holds true for PERMEABILITY and STRENGTH.

Keep these critical factors under control and your scrap losses will drop way down immediately. This isn't just theory. You can see it for yourself by visiting any foundry where Dietert-Detroit sand control is being used.

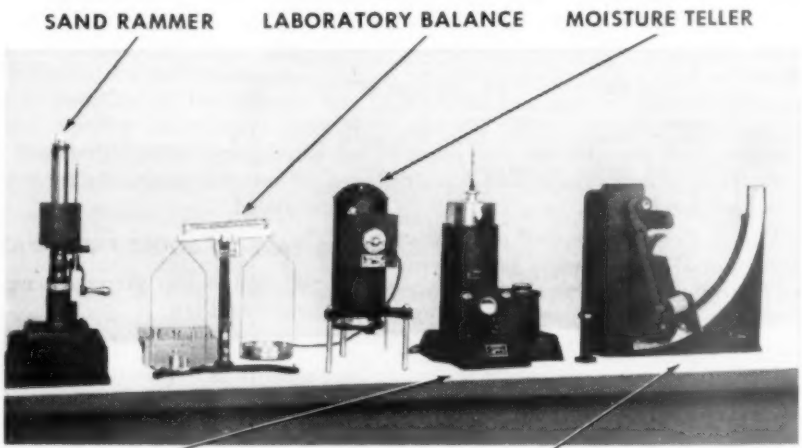
SAND CONDITIONS AND SCRAP LOSSES

	Date	Per Cent Moisture	Permeability	Green Strength PSI	Dry Strength PSI	SCRAP LOSS	Trouble
Floor "A"	Apr. 4	**4.6** OK	71	7.2	69	**1.1%** OK	—
	Apr. 5	**7.5** TOO HIGH	63	6.7	85	**16.7%** BAD	Blows Scabs
	Apr. 6	**3.5** TOO LOW	82	8.1	56	**7.3%** BAD	Dirt
Floor "B"	Aug. 4	4.7	**70** OK	7.0	72	**.9%** OK	—
	Aug. 8	4.5	**35** TOO LOW	8.2	90	**12.6%** BAD	Blow—Misrun
	Aug. 12	4.7	**110** TOO HIGH	6.5	62	**5.7%** BAD	Penetration
Floor "C"	June 15	4.6	75	**7.2** OK	68	**.7%** OK	—
	June 16	4.4	82	**4.2** TOO LOW	58	**15.2%** BAD	Drops—Dirt
	June 20	4.6	60	**11.6** TOO HIGH	88	**5.6%** BAD	Rough
Floor "D"	July 11	4.7	73	7.6	**73** OK	**1.0%** OK	—
	July 13	4.8	79	6.5	**15** TOO LOW	**7.9%** BAD	Cut—Wash
	July 14	4.9	65	8.2	**167** TOO HIGH	**11.8%** BAD	Scabs

HERE'S HOW YOU CAN DO IT *IN YOUR FOUNDRY*

The only new equipment you need is that shown in the illustration. It is all standard foundry equipment, easy to operate and doesn't cost much—$618.85 covers everything. The SAVING you make in the first few months will more than pay back the initial investment. We'll be glad to give you full particulars if you write to us.

5392



HARRY W. Dietert COMPANY

CONTROL EQUIPMENT
SAND · MOLD · MOISTURE
CARBON · SULFUR

9330 ROSELAWN AVE. • DETROIT 4, MICHIGAN

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Rolling Drawer Core Oven

An improved convection, gas fired, recirculating oven. Operation of drawers is entirely selective. Each drawer furnished with individual operating equipment.

Carl-Mayer

CREATIVE ABILITY *Wins* THE ACCLAIM OF OUTSTANDING FOUNDRIES.

FOUNDRY OVENS from Rolling Drawer to Large Standard and Special Types

Engineers in leading foundries are impressed with the initiative and foresight shown in Carl-Mayer oven design. It is clear that every feature has been created for a definite purpose—better baking, faster baking, fuel economy and long service. Write for Bulletin.

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American Radiator Co.
Brown Industries
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Crucible Steel Castings Co.
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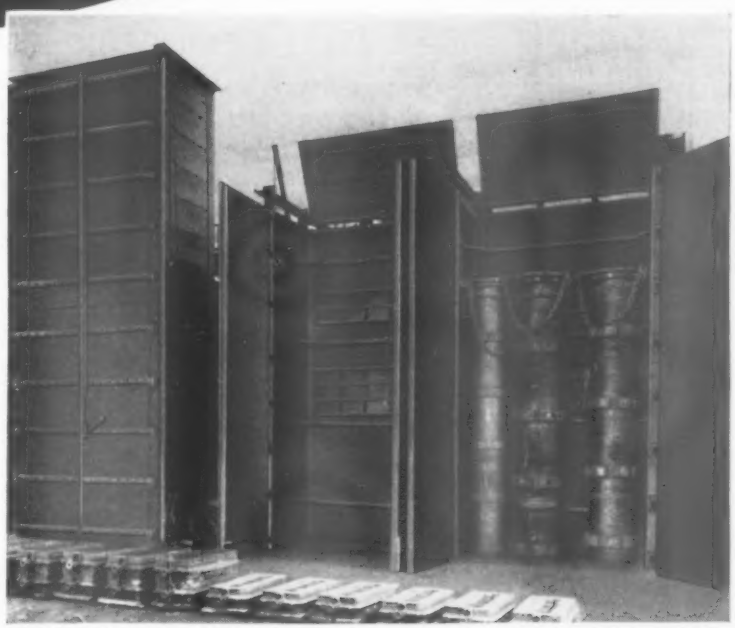
Whiting Corp.

Special Mold Drying Oven

We build special ovens to meet unusual problems. The large oven in illustration is 30′ high, the others, 23′ in height. Furnished with doors on front and top for crane loading. Combination gas-oil recirculating heating system.



ROLLING DRAWER OVEN

PORTABLE RACK OVEN

VERTICAL OVEN

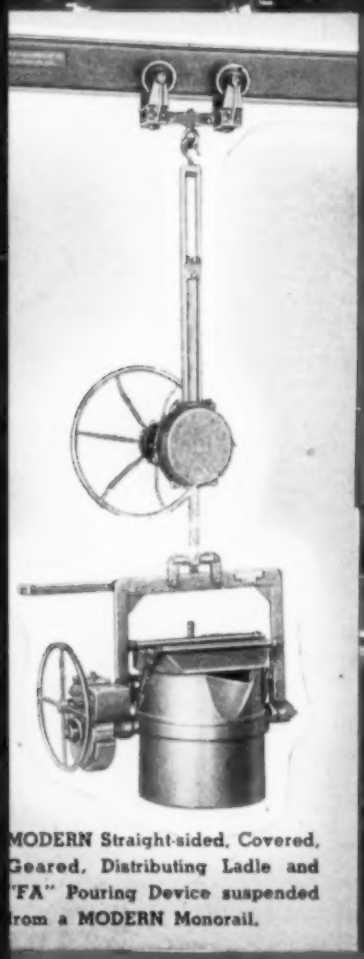
CAR TYPE OVEN

HORIZONTAL MONORAIL CONVEYOR OVEN

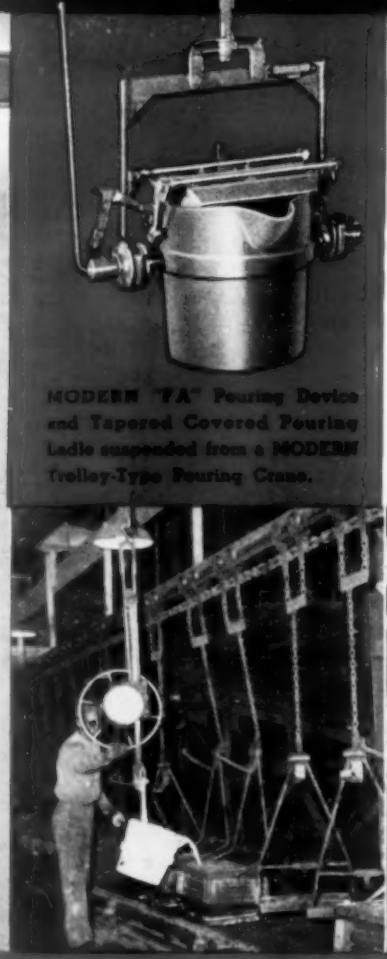
The CARL-MAYER Corp.
3030 EUCLID AVE. CLEVELAND, OHIO

CORE AND MOLD OVENS

The ORIGINAL and still FIRST.. in MECHANIZED POURING



MODERN Straight-sided, Covered, Geared, Distributing Ladle and "FA" Pouring Device suspended from a MODERN Monorail.



MODERN "FA" Pouring Device and Tapered Covered Pouring Ladle suspended from a MODERN Trolley-Type Pouring Crane.

Since the first elementary pouring device was introduced by MODERN, some 30 years ago, MODERN EQUIPMENT Engineers have pioneered important advancements in mechanized pouring. Today, MODERN Pouring Devices are used in all types and sizes of foundries for the distribution and pouring of molten metal . . . swiftly, safely, at low cost! Together with MODERN Overhead, Trolley-Type Pouring Cranes . . . and MODERN Distributing and Pouring Ladles . . . they provide *completely mechanized pouring*, at high efficiency, with a minimum of manual effort.

MODERN EQUIPMENT CO.

PORT WASHINGTON, WISCONSIN

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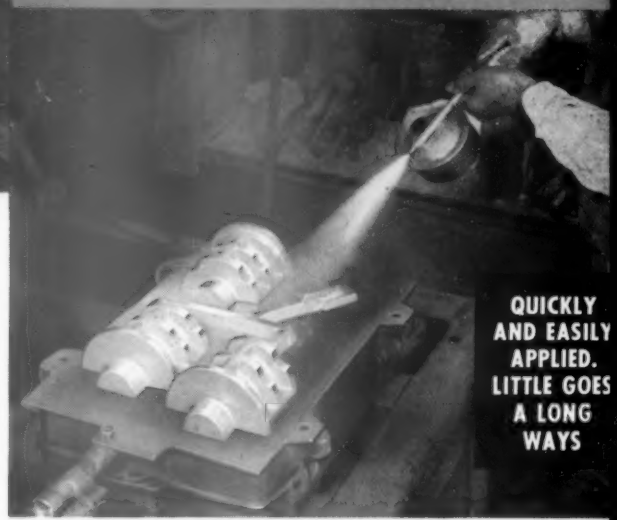
CUPOLAS • CUPOLA CHARGERS • LADLES OF ALL TYPES • POURING DEVICES • METAL POURING SYSTEMS • CRANE AND MONORAIL SYSTEMS • ELECTRIC CRANE

NOTE CLEAN PATTERN, PERFECT IMPRESSION AFTER 48 MOLDS

Stevens "Liquid" Parting

One Parting With No Regrets for Any User



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THE phenomenal success of Stevens Liquid Parting used by production and jobbing foundries everywhere, doing all classes of work, is ample proof of its great value to the foundry industry.

Stevens Liquid Parting is a thin, transparent, light green liquid with a pleasant aroma. It is non-toxic, either by contact with the skin or by inhalation. When sprayed, brushed or swabbed on patterns and match plates Stevens Liquid Parting forms a very thin surface film that insures rapid, clean parting and smooth casting finish. The coating does not "build-up"—is so thin that castings can be held to closest tolerances.

As an all-purpose product easy, efficient and economical to use, you'll find Stevens Liquid Parting can't be equalled as a time and money saver in your foundry.

Order one, or five gallons, or even a drum of Liquid Parting today *at our risk*. If you're not more than pleased with the results obtained, just return the unused portion for full credit or we'll cheerfully refund your money. You be the judge. You can't lose—you stand to gain plenty by way of faster, better, more productive molding. *Send in your order now.*

GET THESE BENEFITS WITH STEVENS LIQUID PARTING

- **ECONOMICAL**—25 to 50 molds can be made from one application to match plate and pattern.
- **SAVES TIME** as against applying dry parting to pattern for each mold.
- **IDEAL** as core box parting.
- **INSURES PERFECT PATTERN LIFT** from sand, even for difficult draws.
- **NON-TOXIC**—NO DUST for molders to breathe.
- **EXCELLENT CLEANER** for surfaces of dirty, gummed-up patterns, match plates and core boxes.
- **PREVENTS RUST** when used before storage of metal patterns, match plates and core boxes.

OTHER IMPORTANT USES

STOPS SAND STICKING and bridging when used as a lubricant coating inside sand hoppers, sand conditioning equipment and on molder's shovels.

Successfully used to coat all metal surfaces to prevent sticking of any material containing water; for example: on plates and rings for molding grinding rings. On molds for forming foam or sponge rubber and on molds for forming ceramic shapes prior to firing.

SINCE 1882 STEVENS INCORPORATED EVERYTHING FOUNDRY DETROIT IS MICHIGAN

LEADING MANUFACTURERS AND DISTRIBUTORS OF FOUNDRY FACINGS, EQUIPMENT AND SUPPLIES

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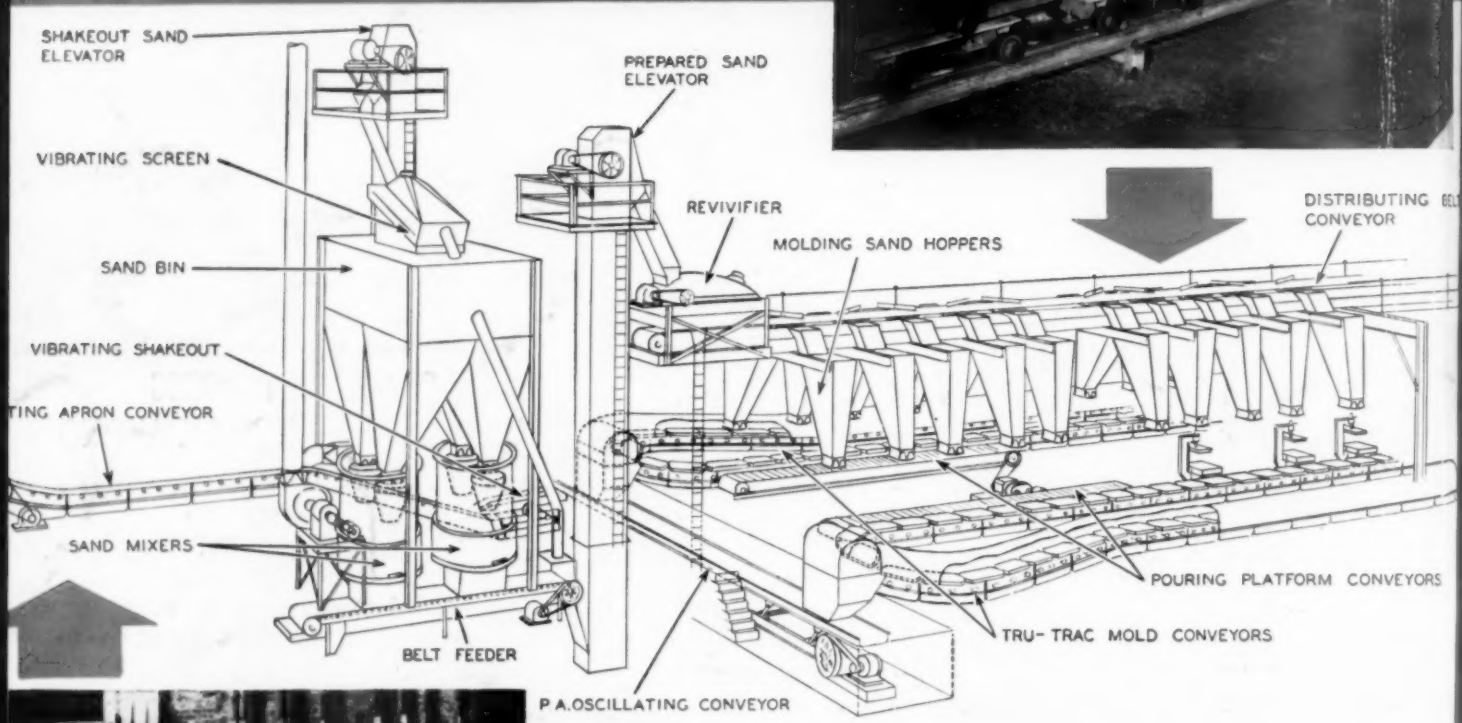
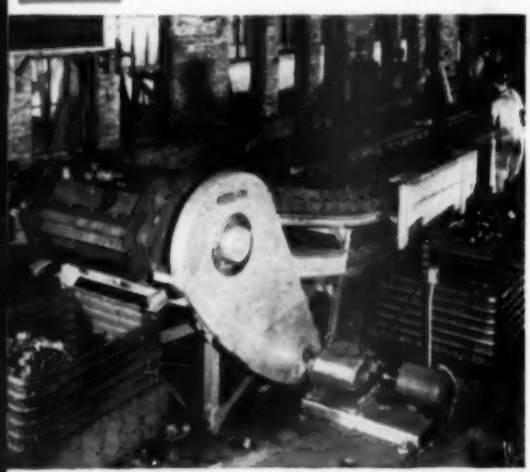
FOUNDRY EQUIPMENT AND SUPPLIES DIVISION

LINK-BELT CONVEYOR MECHANIZATION

Improves Working Conditions in the foundry of NATIONAL SEWING MACHINE CO.





Triples production—eliminates smoke

National Sewing Machine Company of Belvidere, Ill., has taken full advantage of mechanization in their foundry. Production has increased, resulting in lower costs and working conditions have improved.

This Link-Belt mechanized foundry assures continuous production of quality castings due to properly prepared and controlled sand which is conveyed to molding stations and reclaimed from automatic shakeout, in a closed circuit, to sand preparation plant.

Molds are conveyed on Tru-Trac mold conveyor through pouring, cooling and automatic dumping station.

The accompanying sketch and pictures illustrate some of the modernization accomplished. This Link-Belt system has complete dust collection, to eliminate dust and smoke, also castings handling from shakeout screen for continuous flow of castings.

What's your mechanization problem?

11,270

LINK-BELT COMPANY

Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices in Principal Cities.

THE SYMBOL OF QUALITY LINK-BELT

LINK-BELT CONVEYORS

AND PREPARATION MACHINERY

MANUFACTURER'S ASSOCIATION INC. FOUNDRY EQUIPMENT